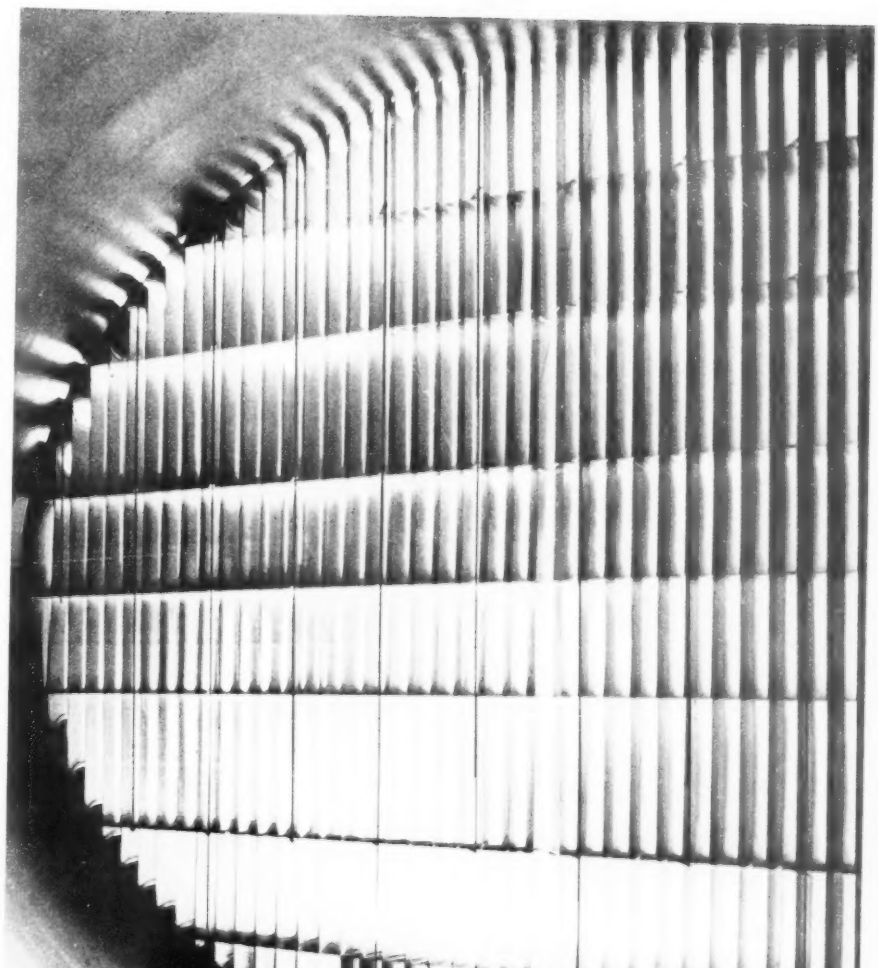
MAY 1959

OFFICIAL JOURNAL OF THE AIR FORCE



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TULLAHOMA
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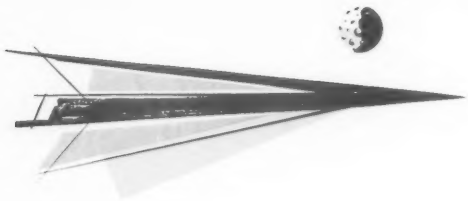
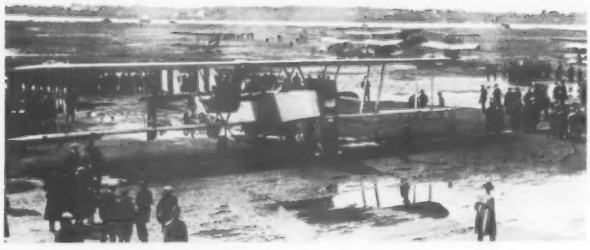


AEROSPACE "POWER FOR PEACE"

In the 20s



"The week of May 15, 1920 was one of extreme historical interest at Bolling Field. The first Annual Army Air Tournament was held here under the auspices of the field, and marks the turning point in the Air Service from the post-war indefiniteness to the peacetime reorganized, progressive, and constructive regime. Its purpose was to acquaint the public with the progress, extent, and limitations of aeronautics together with an insight into what the future has in store in this line. . . ."

Air Service Newsletter, May 26, 1920

And Today

"On this Armed Forces Day, the Air Force again dedicates itself to the preservation of peace and security for all free peoples throughout the world.

"Public awareness of the need to continue a strong defense position is tremendously important. In the light of this need, the Air Force extends a cordial invitation to all our friends to visit those Air Force Bases open to the public on Armed Forces Day. I hope that many will take advantage of this opportunity to become better acquainted with the men, the mission, and the equipment of your Air Force."

—JAMES H. DOUGLAS
Secretary of the Air Force
Armed Forces Day, May 16, 1959

THE Airman

OFFICIAL JOURNAL OF THE AIR FORCE

VOL. III, NO. 5 MAY 1959

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Letters to the Editor

MIXED REACTION

Sir: *I have just completed the article* If You Should Die Before . . . *in the January issue of* THE AIRMAN. *My hearty congratulations for an excellent piece of writing. In the future, we will use it in our dependent's briefing program at this station. We have found that the best way to assure that our people get their house in order is to get the wife curious about problems of mutual interest and she will do the rest. This might not make us too many friends, but, as we have found on our last three casualty calls, it pays dividends.*

MSgt. George Young
Hamilton AFB, Calif.

Sir: *I read with interest your article* If You Should Die Before . . . *Although the point is well taken, the accuracy of some of the information is dubious. I refer specifically to the use of a marriage license as a proof of marriage. This certificate merely denotes authority to marry. A certified copy of the return, made by the official performing the ceremony, is also necessary in most courts. Secondly, you state that "in all cases there are reasons why a will should be made." Often, persons with very small estates, may dispose of their property in other ways and avoid the delay and expense of probate proceedings which are necessary to give legal effect to a will. I might suggest that should another article dealing with legal questions be planned in the future, it might be well to have it written by a qualified lawyer to avoid including just such incorrect information.*

Lt. Harry H. Voigt
APO 179, New York, N. Y.

The article in question was written at the request and with the cooperation and coordination of the Casualty Assistance Branch, Hq USAF. Additionally, it was coordinated through several other interested offices for inaccuracies. It was cleared, with minor revisions, by all. With regard to specific objections, the article dealt with Veterans Administration business exclusively and, for their purposes, a marriage license is sufficient proof of marriage. Regarding the objection to the statement about the need for a will, taken from context, the statement is misleading. Further on, in the same paragraph, it is pointed out that "in each case, your base legal office can advise you on the

Continued on page 48

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THE AIRMAN is primarily a medium for the exchange of ideas and information among Air Force personnel. Readers are encouraged to submit articles, short subjects, photographs, and artwork. All contributions will be given consideration; suggestions and criticisms are welcomed. Opinions expressed by individual contributors do not necessarily reflect the official viewpoint of the Department of the Air Force. All photographs are official USAF photos unless otherwise designated.

Use of funds for printing this publication approved by the Secretary of the Air Force and the Director of the Bureau of the Budget July 5, 1956.

By Custom Unhindered

by MSgt. Edison T. Blair, *Airman Staff*

GENERAL Carl A. "Tooey" Spaatz chalked up a lot of accomplishments, made a lot of weighty decisions, and earned the respect of airmen the world over before he took off his uniform and retired as the first Chief of Staff, U. S. Air Force. His old boss, President Eisenhower, who should know, once called Spaatz the greatest of air strategists.

Yet, when the general was asked on the eve of retirement what he considered his greatest accomplishment while helping to pioneer and build the U. S. Air Force, the foremost combat commander of WW II unhesitatingly answered that the founding of the Air University had given him the most satisfaction.

Even then, when jets were still unproven, missiles were still on the drawing boards, and space satellites were in the early research stage, "Tooey" Spaatz was looking far into the future. Combat experience had taught him the value of a strong Air Force led by able men. He knew that in future wars there would be no time for mobilization; that the old, stereotyped order and tactics of battle would be useless. Victory—even survival—might well depend on a well-balanced air arm with superior plans and leaders to execute them.

The general's satisfaction with Air University is understandable because the mission of AU is the education and development of future commanders and staff officers for Air Force units. AU is a series of post-graduate professional schools integrated into an educational system designed to add judgment to the knowledge the officer already possesses; to teach him why and how to use the vocational skill acquired elsewhere. A leader with command and staff responsibility, General Spaatz knew, must think clearly, objectively, and independently, and he must approach new ideas and new methods with courage and intellectual curiosity.

However, straight-talking General George C. Kenney told an AU graduating class in 1952 that the University could not create leaders.

"That is the prerogative of Divine Providence," General Kenney said. "It (AU) gives you the definitions and illustrates by reference to accomplishments of recognized leaders, the principles and requisites of leadership. If you can absorb them, can utilize them, if you can even recognize them, your course has been worthwhile."

The founders of AU, and those who have guided the educational philosophy since, believed academic freedom and originality were more important than memorizing traditional methods of warfare. Although the University houses the Air Force archives, compiles and publishes Air Force histories, and maintains a library with more than half a million documents concerned with airpower there are no "school solutions" to the problems given students. So all the stacks of historical data that record mistakes, pitfalls, and errors of yesterday are there not to provide answers to today's questions, but a fresh point of view for tomorrow's solutions.

As the educational and doctrinal center of the USAF, Air University is unique among educational systems of the Armed Forces. One of the basic policies laid down by Maj. Gen. Muir S. Fairchild, first commander of AU, in his dedication speech was the intent "to truly edu-

cate, not merely to train or instruct." So all schools that aim at professional education of Air Force officers are within this single command and the headquarters is concerned with nothing else. Technical and mechanical skills are taught by Air Training Command, AU is interested only in broadening education. Headquarters and most of the schools are located at Maxwell AFB, Ala.

The Colleges

The real heart of AU is its two professional colleges, the Command and Staff College and Air War College. Largest is Command and Staff College which consists of Squadron Officers School, Command and Staff School, Academic Instructor and Special Courses, and the Air Warfare Systems Course. Air War College is the senior school of the Air Force and its primary objective is to prepare senior officers for high command and staff duties in large Air Force organizations.

The officer career progression policies of the Air Force could be likened to an hourglass with a broad base of basic military indoctrination that narrows with increased technical or flying training into a specialized utilization field. But senior command and managerial positions require broadly educated and experienced officers as well as those who are technically and competently specialized. Air University is concerned with developing officers in the top half of this hourglass through a progressively broadening educational program.

Air Command and Staff College

After technical and flying training and from three to seven years of cockpit or support experience, a permanent lieutenant or temporary captain in line for a squadron command or staff job is selected to attend Squadron Officers School, the first of AU's professional schools.

The curriculum of the 14-week course covers duties and responsibilities of the squadron officer; air doctrine —the composition and use of airpower with other military forces; the technology applied to airpower; communicative skills; the impact and effect of the current international situation; the qualities of leadership; and professional career development.

About 850 students are currently enrolled but next year classes will expand to 1,000 and level off there. Eventually it is hoped all career and regular officers will attend SOS. Classes are divided into groups of 15 students and the same instructor remains with the group throughout the course. Lectures occupy about half the academic time and they cover every aspect of the Air Force. The remainder of the time is spent in individual research and group seminar discussions. Graduates go back to the field to apply the principles taught and broaden their experience. By the time they are senior captains or majors with 10 to 15 years of commissioned

service, some of them will be selected for AU's second professional school, the nine-and-a-half-month Command and Staff School.

CSS has a quota for only 600 officers a year so selectivity enters the picture. Selection, on a best qualified basis, is dependent on several factors including recommendations of the using command but the decision is made by a central selection board at Headquarters, USAF.

Split into two phases, the curriculum treats, first, command and staff functions, basic Air Force doctrine, and the elements of national power. The second and longer phase deals with operational matters and students go into Air Force plans and programs; capabilities of potential enemy and friendly nations; evaluation of air doctrine; and exercises in command planning. Most of this phase is classified and foreign nationals enrolled do not attend.

Instruction follows the same pattern as in Squadron Officer School—lectures followed by seminars and actual practice in working out vital Air Force problems. The entire curriculum is built around the same sort of problems and situations likely to confront students after graduation.

The Academic Instructor Course is really a training program for selected Air Force military and civilian personnel from airmen through colonel, and from GS-7 upward, who are assigned instructor duties in various commands. Every member of the AU faculty is a graduate and many of the instructors in the Air Force Academy and Air Training Command have attended AIC. Other branches of the service and Allied nations enroll instructors in this school that deals with basic teaching methods, communicative skills, educational psychology, philosophy, and ethics.

There is also a six-week Allied Officer Preparatory Phase to aid foreign students who will later attend Air Command and Staff School. Although students spend most of their time practicing speaking, reading, and writing English in group discussions, they are taught a great deal about U. S. Air Force organization and doctrine and U. S. cultural patterns in the process. They also pick up a lot of USAF slang, jargon, and technical terminology.

More than a thousand Allied officers have attended ACSC courses and more than a dozen have become chiefs of staff in their respective air forces. Many have used their AU education to establish similar schools for their military forces while others now represent their government's air forces as attaches in this country.

The Air Warfare Systems Course offered by the college is a series of short, specialized, comprehensive orientations that provide a quick look into the background, procedures, and techniques of planning and using various weapon systems with emphasis on nuclear and missile weapons. Students are introduced to the whole arsenal of missiles, their characteristics, and their planned use. The Astronautics Orientation phase provides an insight into Air Force plans and research for the space age and its attendant problems.

Maj. Gen. Lloyd P. Hopwood, a former college commandant who is now director of Personnel Procurement and Training at Hqs, USAF, once pointed out: "A typical CSS class represents some 12,000 years of seasoning in the field of airpower, several million flying hours, and several hundred thousand hours of air-combat in the crucibles of two wars."

Because Air University is a pre-war school system, not a post-war system, students are encouraged to develop a critical and inquiring attitude. Visitors to the modern, air-conditioned ACSC building complex that puts the whole college on one campus are told: "We do not assume that the present state of our knowledge concerning any phase of warfare is final or absolute."

". . . it is manifestly impossible that any group of instructors, no matter how able, should encompass within themselves all experience and knowledge in such broad fields as covered by Air University," General Fairchild said in his policy-setting dedication speech.

". . . when your experience or your knowledge leads you to disagree with some point which is made or some theory or concept which is advanced," he told the first enrollees, "it is incumbent upon you and it is your duty to the Army Air Forces, to state your disagreement freely and frankly and argue the point out."

Air War College

This educational philosophy permeates all of Air University and at no place is it more firmly adhered to than in the Air War College. Air War College is also vitally concerned with developing, formulating, reviewing, and recommending military air doctrine. Students are considered full partners in this enterprise.

The quota for AWC is even smaller than that of Command and Staff School and a lot of CSS graduates will never attend it. The selection criteria is stiffer and only officers whose past performance indicates potential growth in leadership are given the nod by the central selection board. Officers whose future usefulness as Air Force leaders is limited are eliminated early. Although AWC is only 12 years old, more than 140 of the 1,300 graduates are now general officers and one-third of these are wearing two stars. This is in keeping with the policy statements made by General Fairchild when he said to the first students: ". . . there is not a

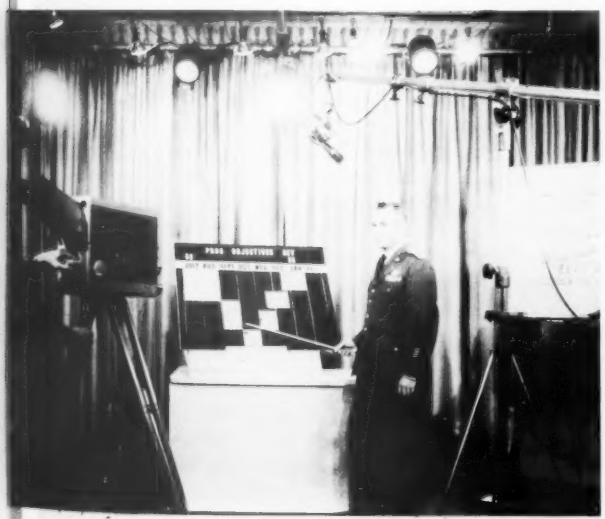
man among you who is here because he was 'available' . . . we might have had many more if we had relaxed our standards . . . this has not been done. The standards have been maintained and it is our hope they will always be so maintained."

Basically, the curriculum of AWC is the study of U. S. strategy and as in the other college, the seminar and lecture method of instruction is followed. But where CSS lectures are given mostly by experienced Air Force line officers with an occasional guest lecturer as an exception, the outside lecturer is the rule in AWC.

These lecturers, both military and civilian, are outstanding authorities in their own fields. The list of guest speakers includes such names as Dr. Dean Rusk, President of the Rockefeller Foundation; Admiral Arleigh Burke, Chief of Naval Operations; General Nathan F. Twining, Chairman of the Joint Chiefs of Staff; General Lauris Norstad, Commander, SHAPE; and RAF Air Chief Marshal Sir John Slessor.

The academic freedom policy reaches its peak in the AWC lecture auditorium. Students, faculty members, and lecturing authorities understand clearly that the views expressed, whether official or personal, are kept in strictest confidence. The fact that a great deal of classified material is discussed is not the only reason visitors are excluded. Lectures and discussion periods are all "off the record."

"No thoughts are excluded, no views suppressed," wrote Col. Ralph L. Michaelis, Deputy for Academic Instruction on the AWC staff, in the *Airpower Historian* a few months ago. "It is only in this atmosphere of open and frank exchange of ideas, interpretations, and opinions that true intellectual advancement can take place."



In the large ACSS classes a closed circuit television system takes the lecturer right into the seminar rooms. TV cameras can move right in close to charts, maps and other exhibits for intimate close-up viewing by every member of the class.

Students aren't obligated to accept the views expressed by speakers because one of the basic objectives of the AU system is to encourage students to think and weigh all matters critically. Sometimes the speaker who has the most unorthodox ideas stimulates the student most. The need for intellectual speculation and profound thinking by Air Force officers was recognized long ago in the old Air Tactical School, forerunner of AU. Citing the dangers of traditionalism and stereotyped thinking, General Fairchild again warned the first students:

"In this new air age, there will never again be time to learn . . . after the emergency is upon us. If our thinking has been outdated and we have provided an obsolete force unsuited to the situation which confronts us, it is quite apt to be over, with a neatness and dispatch which will allow time for learning only three simple lessons: we're wrong; we have failed; we have betrayed our way of life to utter and complete destruction."

Although there is the incessant whine of powerful jet engines, Maxwell AFB has an air of quiet contemplation. This feeling was so pronounced as early as 1952 that it prompted the late Gen. Hoyt S. Vandenberg, then Chief of Staff, to compare it with the air of detachment found at much older institutions.

"Certainly," the wearying general said, "there is a need for plenty of heavy thinking within the Air Force and Air University is about the only place where serious thinking can be done without continuous interruption."

Col. C. L. Overing, a member of the Evaluation Staff attached to AWC, expressed it a little differently:

"We have the finest military library in the world here. We don't have any brush fires to put out. We just sit down and think quietly, and calmly, and work things out."

Evaluation Staff

The Evaluation Staff is an independent study group that grew out of the old Air Tactical Board. It normally has 15 to 20 members, all senior colonels with eight to ten years in grade, all highly qualified experts in their particular specialty. They thoroughly examine doctrinal statements, research the concepts of strategic and tactical application throughout the Air Force, then collate and arrange their findings into official Air Force doctrine. They are providing the plans for the U. S. Air Force that will exist 10 and 20 years from now.

A staff of civilian educational advisors at AU Headquarters and in each school keeps the faculty abreast of educational methods. They are concerned with *how* to teach, not *what* to teach. In addition to these full-time advisors, a 15-man Board of Visitors, composed of the country's top educators and businessmen, meets at least once a year to examine AU's professional educational system.

Appointed by the Chief of Staff, USAF, for three-year terms, subcommittees from the Board look into organization, management, curriculums, methods of instruction, and other aspects of the system. They advise the AU commander on policy matters and report directly to the Chief of Staff. Air University expects, and gets, full, frank, constructive criticism from this Board

Sir John Slessor with his 37 years of military air experience in Britain's RAF is a frequent lecturer at AWC.

of Visitors which can ask some pretty embarrassing questions.

Another touchstone of the quality of instruction is the National Security Forum held each year. This group of prominent civilians from every walk of life become members of the student body for a week. They listen to lectures, sit in seminars and argue their points as emphatically as the students. In the end each group learns from the other.

Research Studies Institute

While the Research Studies Institute is not a part of either AWC or ACSC, it is widely used by students in both colleges. The Historical Division collects, preserves, and makes available to researchers the archives of the Air Force. Last year they researched and answered more than 1,300 requests some of which took several weeks. Some queries demand fast replies. One general appearing before a Congressional Committee was challenged on a point that he remembered personally but had no immediate facts to prove. RSI's Historical Division provided the answer for the general and Congress the next morning.

This division is responsible for the official histories of the Air Force, historical monographs, and special studies. Some of the monographs, being prepared by former general officers of Germany's Luftwaffe, deal with German operations during WW II.

The Documentary Research Division prepares special studies on every subject of possible interest to Air Force leaders. These studies are used by various agencies and some have even been adopted as texts such as *American Foreign Policy in Growth and Action* which is used now at West Point.

The Arctic, Desert, Tropic Information Center, collects, evaluates and passes on to those interested, specialized information on operations in non-temperate climates. An ADTIC team traveled from Alaska to Greenland locating and testing ice airfields used later by heavy transports delivering men, supplies, and equipment to build the vital DEW line air defense network. Other teams have developed and tested survival methods and equipment for use anywhere the Air Force flies.

"We have some marvelously qualified people on our staff," reports Col. R. C. Cobb, commandant of RSI. "Most of them have doctor's degrees, all of them have their masters. We have one man who took leave and paid his own expenses in order to do some special research at the Munich (Germany) Institute of Russian Studies. Such dedicated people are invaluable to us."

The AU Library

No less invaluable is the AU Library with its stacks of 230,000 books, 500,000 classified military documents, 1,500 foreign and domestic periodicals, and complete files of regulations, manuals and directives from Hqs, USAF, the numbered Air Forces, and major air commands. The library collection is growing at the rate of 2,400 books and 4,000 documents each month. Much reference material is preserved on microfilm. There is an extensive film library and a resource collection of 280,000 maps and charts. A photographic laboratory and a graphics section prepare special visual aids. As a research guide, the Library publishes a quarterly *Periodical Index*.

School of Aviation Medicine

Although the School of Aviation Medicine (SAM), now located at Randolph AFB, Tex., is widely known for its research program now probing the reactions of man in space, it has long played an important part in specialized medical practice involving man in flight. Thousands of doctors have attended the Primary Course in Aviation Medicine while many others have completed the advanced course.

Prior to duty assignment, newly commissioned medical service personnel get a four-weeks "orientation" course at SAM's Gunter Branch, Gunter AFB, Ala. The Gunter School also offers some forty other courses to both officers and airmen with the latter primarily training in most of the medical and dental specialties.

Approximately 6,000 students graduate annually from SAM's courses. Particularly important is the Aviation Medicine Specialty Program encompassing five years of training for selected medical officers. Starting with one year of Public Health and Preventive Medicine usually obtained at Harvard or Johns Hopkins Universities, officers proceed to the advanced course in Aviation Medicine, one year of supervised medical practice and two years of field experience on the job, ultimately leading to "Board Certification."

The new multi-million dollar school and research complex being built at Brooks Air Force Base near San Antonio, Texas, will provide greatly expanded research facilities. Also, most Air Force training requirements dealing with Aviation Medicine or related subjects will be accomplished there. Despite the School of Aviation Medicine facilities, Air Force Medical Service has the need for other special training to be conducted through the Air Force Institute of Technology. Several hundred each year are enrolled in courses monitored by the Air Force Institute of Technology.

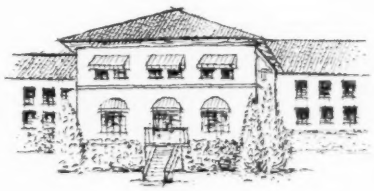
Institute of Technology

The AF Institute of Technology takes care of the

"We just sit down and think quietly, and calmly, and work things out."

specialized education and training of officers in technological, scientific, and professional fields not covered by other schools. Resident programs at Wright-Patterson AFB, Ohio, include undergraduate and graduate education in aeronautical, electrical, and nuclear engineering; engineering administration; industrial administration; applied comptrollership; logistics; and installations engineering.

Non-resident AFIT technical education is accomplished at civilian colleges and universities whose curricula meets specific Air Force requirements. AFIT also offers special training-with-industry educational programs in certain specific fields. A graduate course in astronautics has been added recently along with a companion on-the-job training with industry program. Officers selected as instructors at the Air Force Academy are sometimes enrolled at selected universities for graduate study in their particular field through AFIT.



The AFIT monthly *Educational Information Bulletin*, distributed through base Educational Services Offices, furnishes current information about AFIT programs and quota fulfillment. Educational Services Officers are well qualified to advise applicants on requirements, help them get necessary evaluation of prior schooling, and fill out applications. Because of technological advances in Air Force equipment every eligible officer is being urged to investigate AFIT benefits.

AFROTC

Technology, expressed in terms of supersonic aircraft, electronics, nuclear energy and weapons, and missile systems, has complicated operation to the point that only highly educated young men can operate the equipment and make decisions. These young men will eventually command an even more technical Air Force in years to come and the major source of such officers is through the Air Force Reserve Officers' Training Corps, another facet of Air University.

About 100,000 students at 179 colleges and universities become ROTC cadets each year. Physical defects eliminate about half of them and selection standards and other factors reduce the ranks still more until only about 4,000 receive commissions at the end of four years. These carefully selected young men have been well indoctrinated and have obviously given an Air Force career serious consideration.

"But they are not a finished product," emphasizes Maj. Gen. Turner C. Rogers, commandant of AFROTC. "They still need close supervision and help by the using commands if they are to become the proficient and experienced officers the Air Force can depend upon. Failure to help them only kills their initiative. Judging from some answers to a questionnaire last year, if these young men could do everything that some commands indicated they expected from ROTC officers, there would be no need for generals in the Air Force—the kids could do our jobs."

But properly guided through their technical training periods these young officers can progress later through AU's professional schools into positions of leadership.

ECI

Even the officers and airmen who are not selected for residence education in Air University can still take advantage of the system through AU's Extension Course Institute. Originally established primarily for reservists, ECI had approximately 28,000 actively participating students when Air University took it over in 1950.

Current student count is around 231,000 and includes reservists, officers and airmen on active duty, AF civilian employees, CAP senior members and cadets, and members of other branches of the service. (About 17,000 new students enroll each month, ECI instructors mail out 3,000 objective examinations each working day, answer 300 letters about courses, grades, etc., and award about 5,000 diplomas monthly.)

ECI offers five general courses—Officer Candidate, Squadron Officers, Command and Staff, Air War College, and a Leadership and Personnel Management Course. The SOS, CSS, and AWC courses are prepared by the faculty of these respective AU schools and they closely parallel the residence courses except for classified material. Library and research facilities are available to ECI students. (Senator Barry Goldwater of Arizona, a reserve colonel, recently graduated from AWC this way.) ECI offers another 95 specialized courses covering 29 career areas designed to help prepare airmen for higher skill ratings in their chosen career field.

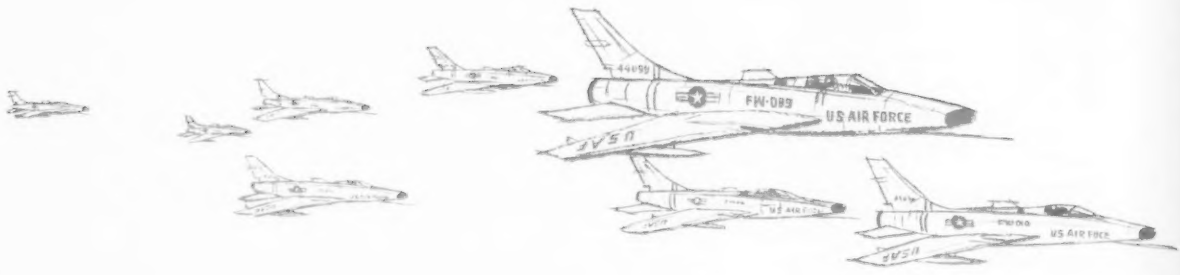
In addition to operating this complete educational system, AU monitors Air Force personnel who are staff members, instructors, or students in Army, Navy, Marine, and joint-service schools and colleges. This is the job of the 3894th School Group. The Group is a liaison agency that keeps the Air Force informed on doctrine, concepts, and policies taught in other service schools. Likewise, keeps Air Force representatives, who annually lecture to 85,000 officers of other services, posted on Air Force policies and concepts.

What then is the goal of this unique educational institution? General Fairchild had that answer too when he dedicated Air University September 3, 1946:

"Should the Air University succeed in educating and producing such planners and future leaders that they may design an Air Force so adequate that it need *never* be used, we shall have accomplished our mission."

So far Air University has done well. That it is still in tune with national policy was made clear recently when President Eisenhower told the Nation:

"We must never become frozen in obsolescence."



HIGH FLIGHT

by Capt. John W. Keeler, *Hq, TAC*

One of the most vital tasks being performed by the United States today is the strengthening of its Free World allies. Economic and military aid is flowing into the life streams of these nations from America. One small unit within the Tactical Air Command plays a leading role in the delivery of a large part of this strength to our allies. The 4440th Delivery Group at Langley AFB, Va., is charged with the operational control of all American-made aircraft while being delivered to foreign countries.

In the past year this unit has moved more than 1,000 jet and conventional aircraft overseas. Deliveries were made to every corner of the Free World—the Far East, South America, the Mid-East, Europe, and Africa.

A mission of prime importance is the delivery of jet fighters to Europe. This operation, known as HIGH FLIGHT, was inaugurated in 1952 under the name of DROP KICK. Under the control of MATS, this operation was designed to ferry jet aircraft across the North Atlantic to NATO nations and operational USAF organizations. Flying F-84Gs and F-86s, DROP KICK pilots blazed the trail for future deliveries of jets to Europe. Without an air-to-air refueling capability the route stops included Dow AFB, Maine; Goose Bay, Labrador; BW-1, Narsarsuak, Greenland; Keflavik, Iceland; and Prestwick, Scotland.

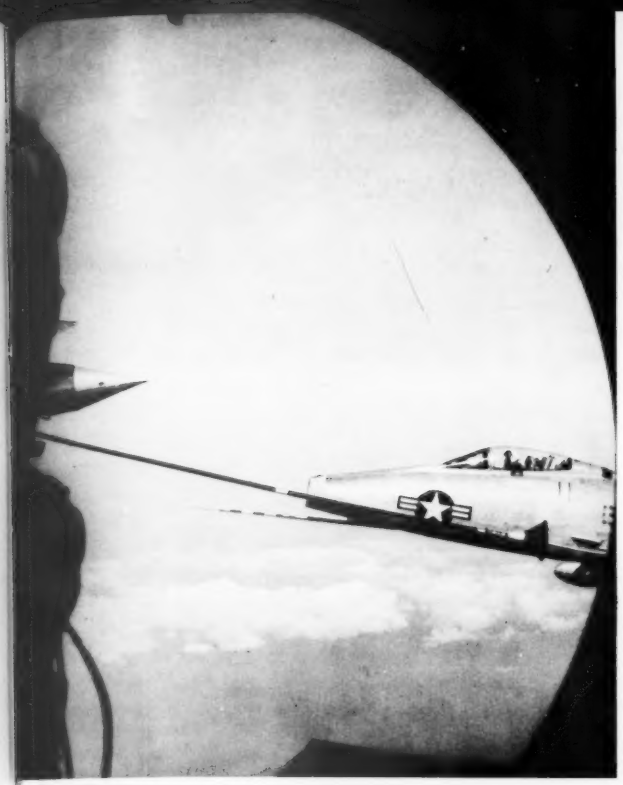
The project name was changed to HIGH FLIGHT in 1953, and was the primary mission of the now deactivated 1708th Ferrying Wing (MATS) at Kelly AFB, Tex. This unit continued the operation until 1958. Some pilots made as many as 14 jet crossings to Europe. A "fraternal" order known as the Frigid Flyers of the Frozen Fjords was formed within the ranks of this elite group.

In January of last year TAC took over this worldwide delivery operation. Many changes were made in the operation including the introduction of a nonstop route through the use of mid-air refueling. Jet fighters now leave the states and within nine hours touch down on European runways. Here is the story of one such flight.

ROUGHLY an hour before dawn, eight F-100s roared into the darkness at Langley AFB, Va. The pilots, up since midnight, were full of steak and eggs, route information, and energy. The *Super Sabres'* destination was 4,500 nonstop miles away. They would fly across the Atlantic Ocean and be delivered to United States Air Force fighter squadrons in Europe.

This is HIGH FLIGHT—the mission of the 4440th Aircraft Delivery Group, Tactical Air Command. This unit is the only organization of its kind in the world today. One of the most complex operations of the Air Force, a single HIGH FLIGHT mission requires the coordinated services of more than a dozen agencies and supporting units.

Hub of the organization is the HIGH FLIGHT control center, located in an unimposing, temporary building at Langley AFB. It is under the direction of Col. Walter G. Benz, commander of the 4440th. Here amid teletype machines, worldwide weather reports, direct phone lines overseas, and walls covered with air routes of the world, pilots are requested from TAC units throughout the U. S.; coordination with Air Materiel Command at the aircraft pick-up point is accomplished;



tanker refueling units are alerted; air rescue squadrons are notified; en route maintenance detachments are contacted; air space reservations are made; and weather information is compiled and evaluated.

This pre-planning and coordination, in addition to pilot briefings, issuance of emergency bailout equipment, phone and teletype conversations with detachments in Bermuda and the Azores, and the preparation of final flight clearances, was done before the eight F-100s made their predawn takeoff.

In close formation the *Super Sabres* climb eastward through the darkness. Wingmen are alert and tense as they keep in formation with the wing light of the plane next to them—only a few feet away. As they level off at 30,000 feet the faint grey of dawn can be seen far ahead on the horizon.

The pilots had gone to bed at 4:30 the previous afternoon. At the request of some who couldn't get to sleep at that time of day, the flight surgeon provided a short term sedative which left no after effects. Special quarters guaranteed them a quiet, uninterrupted rest. Their meals were a special high protein diet planned by the flight surgeon. Breakfast had been filet mignon and eggs with no grease, and a glass of juice. It would be their last meal for more than 12 hours, eight and a half of which would be spent in continuous, high altitude flight.

Hitting cruising speed, one of the pilots feels a dull pain in his left foot. He opens the valve in the boot of his rubber anti-exposure suit. Air pressure inside the boot equalizes with that of the cockpit and the pain goes away.

Far out ahead—some 700 miles—five KB-50J tankers are climbing up for rendezvous with the F-100s. Each tanker was recently fitted with auxiliary jet engines for high altitude refueling.

Another lone aircraft and its crew are waiting for the F-100s. Several hours ago this plane, an SC-54, took off from Otis AFB, Mass. Now it was circling in a 10-mile orbit half way between Langley and the tankers. Aboard, radio and electronic navigational equipment transmit signals for the jet fighters to "home in" on. The group leader of the F-100s watches the needle on his radio compass slowly turn to the right. He speaks into his mike:

"Hello, Duckbutt Charlie Alpha, this is HIGH FLIGHT Kilo. Do you read?" The SC-54's radioman answers,

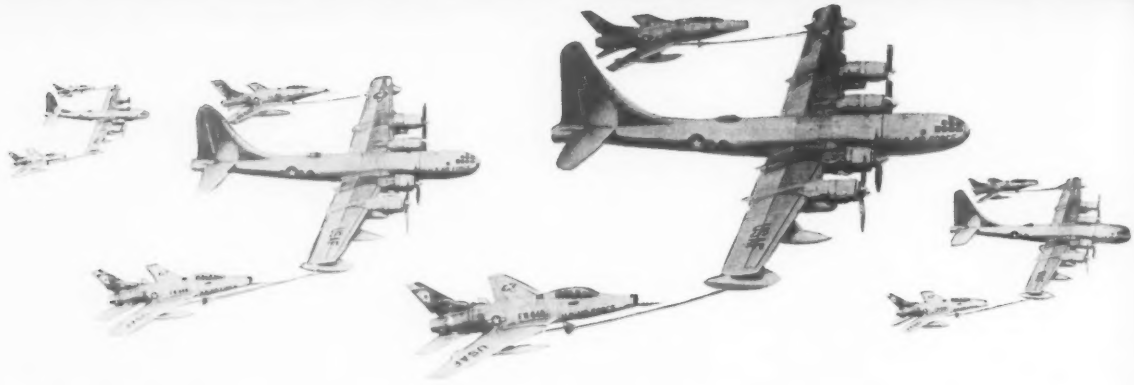
"Roger, Kilo, read you five-five. What's your position?"

"Roger, Charlie Alpha, we're getting a swing on the bird dog from you now, zero seven past the hour."

"Hello, Kilo. Roger your position. Give us a call over Kindley."

The *Super Sabres* drone on high out of sight above the "Duckbutt." The big plane will continue its orbiting until the jets have passed Kindley AB in Bermuda then it will head back to Otis. Besides navigational equipment the SC-54 carries life rafts, flares, and emergency gear just in case a pilot is forced to bail out.

It is daylight now, an hour and a half after take-off. The F-100s spread out in loose formation. Somewhere below the undercast is Bermuda. It was from here that the tankers took off the same time the jets left Langley. Kilo Lead talks briefly with the delivery group control



officer in the Kindley tower. He gets the latest word on the number and position of the tankers, as the flight streaks eastward.

A radar man in one of the big KB-50s some two hundred miles east of Bermuda gets a blip on his scope. He identifies it as the F-100s, still some hundred and fifty miles away. They will overtake the tankers in less than twenty minutes. The tanker commander calls:

"Hello, HIGH FLIGHT Kilo. Nutbutter here. Pick up a heading of zero eight seven to rendezvous."

In a few minutes one of the F-100 pilots calls his leader:

"Kilo Lead, there they are at eleven o'clock low."

Throttles come off and the *Super Sabres* drop down to the tankers' altitude.

Then comes the intricate procedure of "hooking up" for the refueling. Each F-100 has been assigned a position on a tanker. Each tanker will refuel two *Super Sabres* simultaneously from two 60-foot drogues trailing from its wings. The jets slow to 250 m.p.h., their long probes extending from their right wings. Slowly they inch forward. One by one the probes contact the funnel-like receptacles trailing from the tankers. Precious jet fuel flows from the tankers to the F-100s.

Within 20 minutes each of the *Super Sabres* has a full load of fuel. The signal is given to "disconnect." They break away. Jet throttles move forward and the tankers fall behind.

Pilots settle back in their cockpits. Eighteen hundred miles of open water and sky lie ahead of them to their next refueling point. This is the longest leg of the flight.

Time drags. Pilots pull at the watertight rubber collars of their anti-exposure suits. Plastic wrist bands irritate. Despite the 40 below temperature outside, sweat soaks through the quilted inner liners of the rubber suits.

They pass Duckbutt Charlie Baker as they drone east at near sonic speeds. A U. S. Coast Guardsman watches eight tiny ribbons of white high above him as the jets pass over his ship. This is Ocean Station Echo, another navigational aid for the HIGH FLIGHT jets. "Kilo Lead" converses briefly with the radio operator aboard the ship. Then on to Duckbutt Charlie Charlie.

One pilot removes his oxygen mask and munches a candy bar. Another adjusts his rudder pedals and stretches his legs. Another takes a can of juice from a pocket of his rubber suit, drinks it and drops the empty can back in the pocket.

They have been airborne more than four hours now. The second refueling point is nearing.

Tankers from Lajes Air Base are at the rendezvous area a hundred miles west of the Azores.

Kilo Lead spots the KB-50s this time. Hookups take a little longer, however. The strain is beginning to show on these jet pilots. One over-shoots his drogue, and there is danger of the line tangling on his drop tank. His flight leader moves over and gives directions as he moves back from the drogue for another attempt at hooking up. It has to be right this time because the tankers are nearing the extremity of the refueling area. Unless he has taken a full load of fuel at that point he will leave the flight, accompanied by a wingman, and land at Lajes AB.

The probe makes contact on this try. The second refueling is complete and the jets move on toward the east.

As they pass over the Azores the delivery control officer there talks to "Kilo Lead" and gives him the latest weather report from the base of destination in France.

The F-100s flash on toward Europe. Duckbutt Baker Charlie passes. He had taken off from Sidi Slimane in North Africa when the jets were over Bermuda. They pass high over Duckbutt Baker Delta and race toward the coast of Spain.

One pilot changes his sitting position for the fiftieth time, but can't get comfortable. Another winces as his leg muscles cramp. One flexes his arms for exercise.

For seven hours now these men have sat in their "2 x 4" cockpits. They have been flying at near the speed of sound for almost 4,000 miles. Their muscles ache, and the lines around their eyes show weariness.

The grey mist to the east takes on form. Rugged mountains rise out of the sea.

"Kilo Lead, from four. Land-fall ahead."

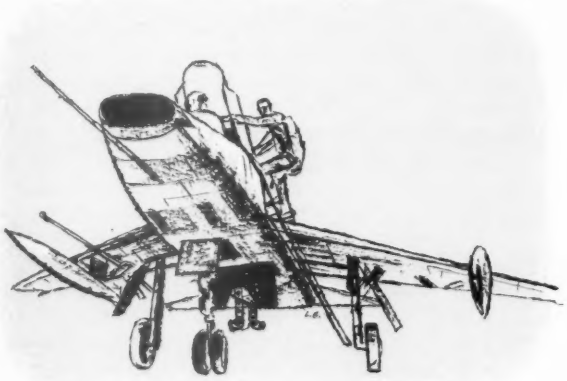
Eyes strain for their first look at Europe. This is Spain ahead. And a surge of energy seems to flow into the body of each pilot. This is the home stretch. From those mountains on it will be "duck soup." One short over-water leg, and at no point will they be out of gliding distance from land should an engine fail. Solid earth; it means a lot after seven hours of open water.

The thought of those thousands of miles of open water had not particularly perturbed these pilots when they took off. But with land in sight an invisible something has given each of them a new lift. Collars are less uncomfortable. Helmets are not as heavy. Even

the circulation in cramped legs seems to have improved. The strain of putting the Atlantic Ocean behind them has had its effect on each of these HIGH FLIGHT pilots.

Each reacts differently. One says a prayer to God. Another thinks for the first time today of his wife and children in Louisiana. Another smiles as he thinks of a remark he heard an airline pilot once make: "That Atlantic Ocean is four-engine water."

Kilo Lead tunes his radio compass to the Lugo, Spain, radio range. The coastline passes below them. Their contrails leave ribbons high over Lugo, and on they drone, over ancient castles and towns. As they leave the northern coast of Spain, to cross the Bay of Biscay, they can see the rugged Pyrenees Mountains to the east.



An hour passes quickly. The panorama of a coastline, distant mountains, tiny villages, and the countryside has broken the monotony of the trip.

At Bordeaux, France, the flight swings slightly north, and someone calls attention to a flight of French *Mystere* fighters passing below them. These are the first jets they have seen since leaving Langley.

Kilo Lead checks his clock. Just 12 hours ago he crawled out of bed. It seems more like a week ago to him now.

"Kilo Lead coming back to 88 percent," he calls.

Eight throttles slowly retard and the *Super Sabres* start their long descent from 30,000 feet. They are 70 miles from destination now. Fuel loads are light, and mach needles climb as the jets continue their let-down.

Backs ache, parachute harnesses cut into shoulders, arms and legs are stiff. But this is the let-down they have been waiting for. This is Chateauroux, France, 4,503 air miles from Langley AFB, Va.

The *Super Sabres* touch down gently on the runway. Moments later they are parked in line and eager maintenance men crowd around them. Canopies open and the pilots remove their helmets. Ladders scale the side of each jet. A sergeant climbs up to greet a pilot.

"Welcome to Chateauroux, sir. How was the flight?"

"Long, sarge. Long."

HIGH FLIGHT Kilo has completed its mission. Back at Langley a phone rings.

"That's right, Mac. We'll need six pilots in place Monday for HIGH FLIGHT . . . Roger. HIGH FLIGHT Lima."

THE SHRINE AND THE SYMBOL OF SADO SHIMA

On the island of Sado Shima, about 60 miles off the coast of Japan, a weather-beaten Buddhist shrine stands perched on a mountaintop. At certain seasons of the year, 100-mile-an-hour winds buffet the wooden frame structure, rattling at loose boards and whistling viciously through cracks in the roof. But the shrine is a sacred place to the thousands of devout Buddhists who make the annual spring pilgrimage up the mountainside to observe the rites of their ancient faith.

The mountain, too, has a particular significance for the men of the 611th Aircraft Control and Warning Squadron as they go about their day-to-day share of guarding the way of life which insures freedom of worship for everyone. Within a stone's throw of the shrine stand the radomes in which glowing scopes keep perpetual watch on the aerial approaches to the mainland of Japan.

But the journeys of the radar men from the base camp to the summit cannot wait for the sympathetic atmosphere of spring. Once a week, 75 airmen ride, walk, and crawl the five treacherous miles to the site nearly 4,000 feet above the surrounding sea. In summer the trip is a relatively routine ride in a jolting GI truck up a narrow winding road cut into the mountainside. But through the winter, elapsed time has a way of stretching from three to as much as seven hours when the final stage of the journey must be completed on foot.

Maj. John C. Bonson, commander of the complement of 200 men, can point to a number of unique challenges connected with his operation. There is the matter of purifying and filtering melted snow for drinking water; there is the problem of coping with the treacherous mud that comes with the thaw.

But when the sunshine of spring drenches the mountaintop in glorious beauty and the 130,000 Japanese islanders look up in the direction of the shrine that stands between Earth and Heaven, there is a reawakened awareness for all of the value of the things that freedom means.

USAFE'S NUMBER ONE AIRCREW

by TSgt. John R. German, *USAFE*

AIR FORCE General Lauris Norstad took a long last look at the world polar-projection map on the wall behind his desk.

Through the small window of his Lockheed C-121 *Constellation* shone an especially bright, sunny day for March; but he didn't realize it. To the man best known as "NATO's Number One Military Commander"—head of the Supreme Headquarters, Allied Powers, Europe (SHAPE)—it meant just another full day of concentrated head work.

Suddenly, he sat down at his desk, picked up the telephone and called the Pentagon in Washington to give them an awaited decision: ". . . yes . . . yes . . . that's right. Well, we'll be landing in Italy in another 30 minutes That's the answer I'll give them to pass on to the Sixth Fleet. . . ."

So it goes, week after week—the year 'round, for one of the hardest working men in the NATO military structure. And, to provide this tremendously important air-office-transportation for such a busy man, it takes proficient and flexible aircrew teamwork.

For instance, what the SHAPE crew considers to be a normal flight could easily be compared with "pushing the panic button" to other USAF crew members.

A typical example of this occurred only last December when Mr. John Foster Dulles, Secretary of State, was in Paris for a special NATO conference. When he arrived at Orly Airport to return to Washington—on a Saturday evening—aboard his aircraft, minor engine trouble prevented his departure. The only alternative was to use General Norstad's Lockheed C-121 *Constellation*. Time was of the essence—as always in such matters.

"Number One Aircrew"—Front row (l to r): Maj. Cecil Smith, pilot; Maj. Jack Daly, navigator; MSgts. Carl Dunnick and Melvin Miller, engineers; MSgt. Benjamin Tucker, radio and radar; and Maj. Jack Umbaugh, A.C.

Within 45 minutes the general's nine permanent crew members had been contacted at their homes (all are married and live a minimum of five miles from the field); all were dressed appropriately enough in class A's to pass any military inspection; and, all were going about their respective jobs competently as the huge aircraft left the end of the runway with the Secretary comfortably on board.

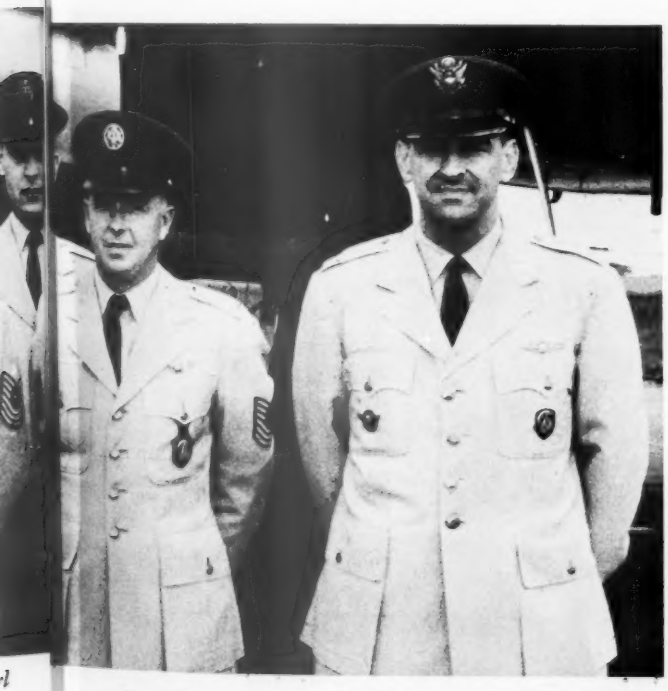
Although this type of mission is not a common occurrence, it does happen occasionally and bears out why this team is considered to be one of the most impeccable crews in the U. S. Air Force and "USAFE's Number One Aircrew."

The eight men working for aircraft commander, Maj. Jack E. Umbaugh, are "on the ball" as he puts it dynamically, seven days a week, around the clock. "We have to be. We're expected to be prepared to go anywhere in the world—on a moment's notice."

But perhaps the main brunt of a fast-action flight is shouldered by the two flight stewards MSgts. Pete Mitko and Roland Hearn of Springdale, Pa., and Cuthbert, Tex., respectively. Before being assigned to Paris, they were both assigned to Washington National Airport with the MATS organization there.

Imagine, if you possibly can, what it is like to have to plan meals for as many as 20 VIPs from almost as many countries. The usual minimum of meals served during a flight of this kind is three. Three times 20 is 60.

"This wouldn't be too bad," they say smilingly, "but some of these NATO gentlemen are on diets, some don't like lamb, others dislike roasts, and still others like their two-minute eggs done at exactly two minutes. Have you ever tried to boil a two-minute egg at 15,000 feet? Try it sometime and you'll find, through practice, it takes about five minutes."



Second row: MSgt. Roland Hearn, steward; MSgt. Hiawatha Echols, engineer; MSgt. Peter Mitko, steward.

Under the circumstances, they excellently provide tasty delicacies. All meals are especially prepared and expertly served from the small galley aboard the aircraft. Food is purchased both at the local commissaries and on the local markets.

Flight Planning

Among the opinions of a great many Air Force 'pros,' Major Umbaugh also has perhaps the most unique aircrew wearing the blue uniform. All are hand picked by the commander and personally approved by General Norstad. Each has proven his capabilities long before being assigned to this 'top job.' And, they must keep proficient due to the particular type of flying required of them.

Whenever the general is to fly anywhere the entire complement is expected to be at the aircraft three hours in advance of the take-off schedule. Generally, three days of laborious planning go into every trip.

Due to the short span of flying time between many NATO countries in Europe, plans must include aircraft guards; customs documents; weather (of which some of the world's most contradictable is located on the European Continent); prior coordination with all of the various countries for security measures; and so on. But as always, the doors of the SHAPE C-121 are inevitably open precisely at the time the tall, slim, four-star general pulls up to his plane in a special staff car driven by his long-time chauffeur MSgt. Robert "Bob" Seeley. Seldom does the general miss the exact timing.

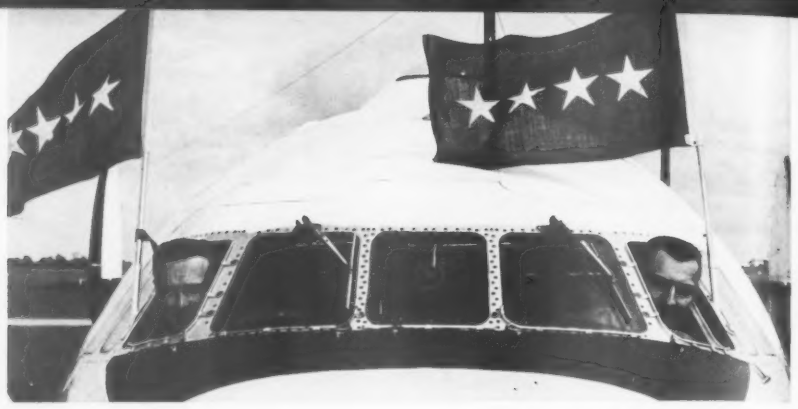
The second his foot touches inside the aircraft, number four engine is turning. Before 20 seconds have passed all four propellers are spinning and the "Connie" is moving towards the taxi strip for take-off. Preprimed engines by flight engineers MSgts. Melvin Miller, Carl Dunnick, and Hiawatha Echols, allow for this rapid movement.

Here again, each engineer has a background of his own. Chief engineer "Mel" Miller, for example began his aviation career as an engineer on a Navy blimp and, today, is considered to be one of the most qualified flight engineers in the USAF. Miller has 16 years' service and is a native of Granite City, Ill. Before being assigned to the general's crew, he was a flight engineer with the Special Air Missions Squadron in Washington, D. C.

Second is MSgt. Carl Dunnick of York County, Pa. Sergeant Dunnick began his military service 12 years ago and was also formerly assigned to Washington before his present job as engineer and panel man.

Dunnick, like Miller, is widely known throughout Air Force engineering circles as a very competent technician. Again, like Miller, Dunnick served with the VIP section at Washington National Airport.

The third engineer, assigned to the crew for perhaps the longest period, is MSgt. Hiawatha Echols. Echols, who comes from Oklahoma City, Okla., has been with the general since he came to Europe in 1951 as Commander in Chief of U. S. Air Forces, Europe (USAFE),



Pilots in position and ready to start engines for flight to Munich, Germany.

and later simultaneously as Commanding General of the Allied Air Forces, Central Europe (AAFCE), at Fountainbleau, France.

But, then again, all crew members on General Norstad's plane *have* to be good. As Major Umbaugh said emphatically, "There's not room for one single mistake in our business."

To bear out this point, he spoke rather proudly of the only time anything of a serious nature ever took place. It happened soon after taking off from London, England, on a bleak winter's day not very long ago. Sergeant Mitko, the steward, tapped gently on the door of the general's stateroom where he was changing his uniform into his more comfortable grey slacks and favorite tweed sports coat with leather elbows. (The general always wears this particular jacket while flying. To be able to relax aboard his aircraft after a day of straining conferences, is one of his greatest pleasures. As one man said ". . . that's about the only time he can be by himself without being asked for some sort of decision.")

"Sir," Mitko asked, "would you please sit in your seat and fasten your safety belt." Without a query as to why, the "world's greatest passenger," according to his crew, immediately did as he was asked. A few moments later the huge aircraft had landed safely back at London airport where ambulances and fire trucks stood by. Unknown to General Norstad, one gauge, among the maze of instruments in the cockpit had suddenly registered a fire in a starboard engine. As Dunnick said afterwards, "It was just a hole blown in the exhaust stack which allowed the heat to touch a specific instrument and gave the warning signal indicating fire." Without difficulty, and within a few minutes, the engineers had corrected the deficiency and the plane was airborne again headed toward Paris to complete the trip.

Extensive training in both ground and air safety is always of major concern to the entire crew for the sake of the general—and themselves. Many hours are spent in practicing emergencies each month during actual flying missions in keeping themselves familiar

General Norstad discusses flight from Orly Field, France, with Major Smith, left, and aircraft commander Major Umbaugh.

with ditching procedures for over-water flights, engine fires, and the score of other emergencies which could possibly create a flying hazard.

Adding a note to the tenor of their perfect safety record, the general said the other day, "I believe they are 'the top executive crew' in the U. S. Air Force. Of all the years I have flown with them, I don't remember one occasion which was cause for concern." And that comment, coming from such a famous man, is a feather in any crew's cap.

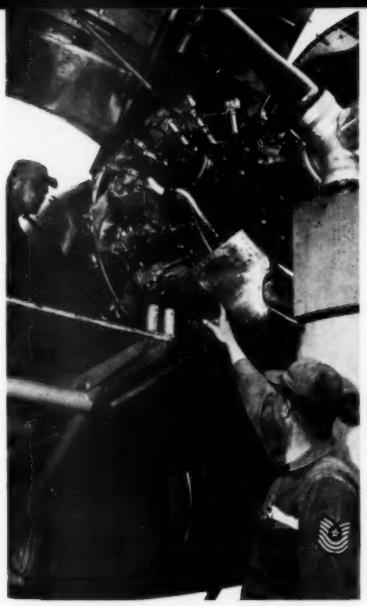
But to accomplish this feat and be worthy of such praise takes a lot of doing at times. As an example of this, teamwork is their key word. During all of their trips throughout the world the crew has seldom missed an ETA by more than half a minute before the wheels touched the ground. A schedule is a schedule to them.

Their normal timing, irrespective of where they may be going, is within 10 to 20 seconds of the schedule when the wheels of the "Connie" touch the runway.

One main reason for this exact timing is the amount of international dignitaries of the various countries who are usually awaiting the general's arrival at the airport to whisk him away to top level NATO conferences. And, this type of timing keeps the entire crew on their toes during every flight. Everything is geared to that pre-established landing.

When airport facilities permit, all landings are made by GCA radar which is audibly monitored by the general who has a special intercom system hooked up to his stateroom.

Primarily responsible for this exact timing is the close coordination between the pilot, panel engineer, and one of the Air Force's brilliant navigators, Maj. Jack Daly of Newark, Del. Major Daly, a senior navigator and former chief navigator for the VIP squadron at Washington National Airport, has a world renowned record and knows almost every remote corner of the globe. His minute plotting of winds, drifts, altitudes, and other elements peculiar to his specialized skill, gives the pilots their exact position on course at all times. This information is passed over to the panel engineer (which might be any one of the flight engineers), who, in turn,



MSgt. Joseph Waszkierscz, head of the SHAPE ground crew section (right) discusses a mechanical problem with one of his ground crewmen, TSgt. Ollie Dreadin.

MSgt. "Pete" Mitko prepares to serve coffee to VIPs flying aboard the C-121 en route to Norway.

General Norstad arrives at Orly Field, Paris, from SHAPE headquarters aboard a Bell helicopter. The "chopper" is used to transport the general to Orly when he is pressed for time.

(Former INS photo)

On some flights General Norstad sits in Co-pilot's seat.

regulates the engines' speed to insure exact touchdowns.

Because of the number of NATO countries visited the crew and the aircraft must be the U. S. Air Force ambassadors of Americanism at all times. Personal appearances and diplomacy of the crew are an unwritten requirement and constantly demanded of them.

Most NATO dignitaries and "every NATO country ambassador" has, at one time or another, traveled aboard the aircraft, which like the crew, is considered to be number one in Europe. Mr. Paul-Henri Spaak, Secretary General to NATO was a recent passenger.

Before being modified and assigned for General Norstad's use, the plane has had its share of other VIP "owners" including the late General Hoyt S. Vandenberg, Chief of Staff, USAF; the late Honorable Harold Talbot, Secretary of the Air Force; and the Honorable Donald Quarles, former Secretary of the Air Force and presently Deputy Secretary of Defense.

One of the plane's outstanding characteristics is, as previously mentioned, its worldwide telephone system and radio-radar equipment installed and operated by MSgt. Benjamin Tucker.

Sergeant Tucker is considered by many to be one of the Air Force's top radio and radar technicians. Since being assigned to the general's original crew in 1951, he has personally installed practically each piece of equipment, and, on certain occasions, even built the apparatus as a "not-often-found" operator-mechanic.

Tucker, a native of Marietta, Ga., handles all flights himself and is the only radio-radarman assigned to the aircraft. His equipment assembled in a small compartment behind the pilot consists of 19 individual radio-radar systems.

Having taken every practical course available in his highly technical field, he is now planning to attend a specialized school in the United States when his present tour is completed.

As a matter of fact, all crew members are continually taking USAF sponsored correspondence courses to keep abreast of latest developments in their respective fields.

Probably the man behind the scene, but still an integral part of the crew-team is Maj. Cecil L. Smith of River Rouge, Mich. Major Smith is the co-pilot and has been a flying partner with Maj. Umbaugh for the nine years they have been together as the general's personal pilots.

Major Umbaugh, a veteran of seventeen years' service and native of Camden, Ohio, first met with Major Smith after they were selected by General Norstad to fly his Boeing B-17 during "Operation Swarmer" in the U. S. He was then Vice Chief of Staff, USAF. They have flown the general ever since.

Between the two majors they have a combined total of over 17,000 hours of flying time—practically all of it being "executive-type" flying. The aircraft commander has over 10,000 hours and Major Smith the remainder.

In the absence of Major Umbaugh, Major Smith automatically assumes his duties as aircraft commander and another pilot fills in as co-pilot.

In this respect, the general has "complete confidence in my crew." But, then he has to have when, during certain NATO maneuvers, they are required to land under adverse weather and other conditions at 15 to 20 air fields in five to 10 countries—in a single day.

Always on the Go

Not counting NATO maneuvers, they fly an average of 70 hours a month. In one instance, they flew four trans-Atlantic trips between Paris and Washington in five days.

Although this particular NATO aircrew does not have the easiest job in the U. S. Air Force, they say it is very gratifying. "Working for such an admirable man can't be anything but gratifying," one member of the crew said recently.

"We've seen General Norstad return to the airplane very tired after a day of top level conferences. . . . I wouldn't want his job for anything in the world. Having to make important decisions, like he has to, that affect the whole military structure of NATO would be a strain on anybody."

That's one of the many reasons why his crew tries its utmost to tend to his every possible need. When long distance flights come up, they are flown mostly at night. This is done so that the 51-year-old general can finish up work details at his SHAPE headquarters and board the "Connie" for dinner and a night of sleep and relaxation. "It's much easier for the general to work at a special meeting when he's relaxed. And that's the way we try to keep him—relaxed, rested and physically prepared to meet the huge tasks of the day set before him," so said one of the master sergeants. "I don't think anyone could ever relax him mentally because of the pressure of his job."

To use the words and sentiments of the USAF's Supreme Allied Commander, Europe, in recognition of the respect and dedication shown by his aircrew, General Norstad said recently, "I cannot recall one instance during the eight years I have been in Europe that my aircrew has ever failed to fulfill a flight mission to the letter. Their scrupulousness and devotion to their respective duties is a tribute to the United States Air Force."

And, this statement coming from "Europe's Number One Commander" is a tribute to USAFE's "Number One Aircrew."

There are a couple of faithful old standbys the Air Force just couldn't do without. One is the Gooney Bird; the other, the

FLIGHT ENGINEER

Story and photos by Maj. Paul K. Jones
Hq, 5th Air Force

"Number one" engine gets careful scrutiny as the flight engineer makes a walk-around inspection before the return flight.

IT WAS Sunday, but for SSgt. Jim Chadwick, flight engineer, the day began at 0500 when he pulled himself out of bed in the chilly air of a private rental about 10 minutes away from Tachikawa Air Base outside of Tokyo.

A quick breakfast was followed by the drive to the base in predawn blackness. He parked, then walked out to the hazy shape of a C-47, threw the beam of a flashlight at its tail and read the number: *0-349436*. His bird. Nothing very special about it—just one of the hundreds of *Gooney Birds* still flying in the Air Force. He unlatched the heavy door, clambered in, threw the beam of his flashlight around the interior, picked up the flight and maintenance record, checked yesterday's entries. He walked into the pilot's compartment, poked the beam of light along the panel over the windshield, checking switches. He went back through the passenger compartment, shoved the door open and dropped to the ground.

Ducking under the broad wing he strode to the bird's belly, opened drains to get rid of water condensed in the fuel tanks. Gas spewed on his hands, evaporated icily. He kicked the chocks to make sure they were firmly set against the wheels, flashed the light into the wheel wells and at the backs of the engines, looking for leaks.

The chill of the morning began to seep through now and he shivered as he walked back to the door and climbed in once again. Taking his position in the pilot's seat he pulled the brake handle tight, turned on the battery switch and cockpit lights and went about the business of running up the engines.

After a few halting revs with the starter he turned on the prime and ignition. The right engine coughed, sputtered, caught and he advanced the mixture control.

It sputtered a bit more, then roared into full life. When it smoothed out he turned his attention to number one engine on the left and started it in the same manner. Pressures and temperatures came up to normal. He spent 20 minutes there with the engines running, concentrating on the instruments, checking props, mags, mixture, ignition, radios, lights, and deicing equipment. When he was satisfied, the first light of dawn had begun to filter into the cockpit and as he shut the engines down completely there was no longer any real need for his flashlight. He checked the deicing and hydraulic fluid levels, got containers from the rear of the plane, filled both reservoirs. He shivered again.

A large portable heater with a flexible hose two feet in diameter was standing beside the hangar. Chadwick hailed another airman who helped him haul it up to the aircraft. They inserted the hose in the wide open door and started the heater. A wave of warm air flooded the interior of the plane—slowly forcing the chill out. When the pilots and passengers arrived they would be comfortable.

He left the airman at the heater and went off to get flight lunches for the crew.

Later, when the crew arrived, he followed the pilot on his walk-around inspection. The pilot looked, poked, prodded—found nothing. The passengers arrived. Eight officers—a tactical evaluation team from 5th Air Force—were headed for Itazuke. Chadwick helped them fit their chutes, then took his place, standing behind the seated pilots. He followed them through their procedures. The copilot reached up to the electrical panel, looked out his window at the fire guard who was standing by the right engine. The prop ground around for a few revolutions, sputtered and then roared into life. It smoothed out, settled down. The copilot adjusted the throttle, checked pressures, waited until the fire guard had walked around to the left engine, then pressed the starter switch for number one. Nothing happened. Both pilots looked up. Chadwick leaned forward and saved them a lot of frustration.

"Battery's weak, sir. Rev up number two and we'll get more juice."

They did and then tried the starter again. It worked fine. The engine sputtered, caught, roared into life. Now the plane was alive, ready. It taxied out, away from the other parked planes. On the taxiway adjacent to the runway it stopped, turned into the wind and the pilots ran the engines through another complete check. Chadwick followed the whole procedure closely. This was his bird and these were his engines. He knew them better than anybody, better than the pilots. They were aware of this, too, and appreciated his being there.

Ice Forms

On each flight Chadwick flies with different pilots. His squadron, the 6000th Operations Squadron, exists to satisfy the flying needs of Headquarters, 5th Air Force and one of these needs is to keep up the flying proficiency of the pilots and navigators who are, for the moment, primarily concerned with policy making. These pilots can never become as familiar with this one particular airplane as the engineer, for he is with it every day, during both its flights and its trips to the maintenance docks. And he knows, for example, when a battery is weak.

The plane moved out onto the runway, lined up with the center, paused briefly for final clearance from the tower. Then it started rolling. Engines were pushed from idle to maximum power within a few seconds and the aircraft was subjected to its severest test. Chadwick, alert, closely watched the engine instruments, listened, watched the procedures of pilot and copilot

A refueling truck services 49436 during its turn-around stop. The flight engineer is responsible for all servicing and maintenance of his aircraft.

Sipping a cup of now lukewarm coffee, SSgt. Jim Chadwick takes refuge from the snow storm under the tail of his aircraft, while awaiting the refueling truck at Itazuke AB.

providing one final check at this critical stage. And then the bird was airborne—climbing steadily. The gear was retracted, engines were throttled back, the first turn was made with the engines sounding good, instruments steady, the airplane seeming capable. The crew relaxed for the climb out to 8,000 feet.

Coffee was available. Chadwick went back to get it and passed it around. Now there were four long hours ahead. He pulled a book with a provocative cover out of his pocket, sat back in his cubby hole directly behind the pilot and relaxed.

About an hour out the plane pushed into a billowing mass of clouds. It was turbulent—uncomfortable. The plane bucked, yawed, rose and fell. Looking up, Chadwick saw the windshield suddenly frost over and knew that ice would also be forming on the wings and props —white stuff which can still destroy aircraft after all these years. But if the crew knows how to handle its deicing equipment there should be no cause for alarm. Chadwick knew—and he watched the crew. If they went through the proper motions to get rid of the ice he could relax. If they didn't, he would have to advise them. They knew. A tattoo of ice suddenly drummed against the side of the fuselage, thrown off by the props. A stream of deicing fluid cleared the windshield—and then the plane was through the clouds. The sun was out, the sky blue. And the flight settled down for three more grinding hours.

Such a flight is not all boredom. Few people in the world get to see as much of a country as Chadwick does. The geology of Japan—its mountain backbone; its short, wide, walled-in river beds; its bays and islands in the inland sea; its abandoned WW II airfields; its fishing villages huddled in coves beside the Pacific; its agricultural villages clustered in small flat bare spots halfway up the sides of mountains; its tremendous city complexes like Tokyo, Yokohama, Osaka, and Kobe, especially at night when a billion lights embroider these places into the black quilt of earth. These are rewarding sights. They are satisfying sights. They make it all worth while.

Before arriving at Itazuke, the pilot requested and received a weather advisory: snowing—visibility one and a half miles. This meant a Ground Controlled Approach but there was no great problem. The plane descended into the cloud layer. Ice formed again but the deicers took care of it. Chadwick double checked as the pilots went through their prelanding cockpit procedures. He insured that the gear got down in the proper sequence, that the gear warning lights were green, that the hydraulic gauge showed sufficient pressure, that the props were forward, boosters on, and that the fuel selectors were on the proper tanks. Everything checked and Chadwick was silent. For now it was up to the pilot who must concentrate on the voice coming through his headset while he manipulated the controls to keep the aircraft in the proper position, on course and glidepath, to satisfy the GCA operator watching an electronic blip on the ground—many miles away.

The pilot did it without noticeable effort. The plane descended, made a few very definite turns. Flaps were lowered, the altimeter slowly unwound and then the runway appeared dimly ahead. It passed under the wing, the craft flared out, settled, made the inevitable "proficiency pilot bounce" and then sat down for keeps.

Chadwick studied the copilot. Props forward, flaps up, boosters off, cowl shutters open, electrical switches off. He watched to see that these things happened. If they hadn't—he would have provided a reminder.

The plane taxied in accordance with instructions from the tower, ended up in the boondocks five miles

The flight engineer must refuel the aircraft for the return flight—no matter what the weather. The perch is slippery, the nozzle cold.

from base operations. And now Chadwick was busy again. As the first man out of the aircraft, he fastened the door open for the passengers, set up the steps for them to descend, went under the wing and helped chock the bird. The snow was coming down hard and he worried a little about its accumulating on the wings but it was very wet and soon melted.

He walked off to a refueling truck some distance away and told the driver what he needed, then came back to his aircraft and took shelter under a wing while the crew and passengers climbed into a station wagon headed for the warmth and shelter of base operations. This was the worst part of the whole job. Although the first stage of the flight had ended for everyone else in the crew—the hard work of preparing it for the next stage had just begun. Before Chadwick could relax and grab a bite to eat like the others he must crawl up onto the slippery wings, refuel the bird in the driving snow, check the oil, and give the engines a good once-over for possible leaks or any other hints of a potential malfunction.

The day reminded him of another flight not long ago when he had to change the plugs of his number two engine in a howling, wintry blast on the open sweep of a Korean air base. That day his hands were blue—his knuckles ragged and bloody. It was a miserable experience. But Chadwick had done it by himself. And when the job was done and the engine roared again—sweetly—there had been a tremendous satisfaction. The bird was his bird—his responsibility—and it was a good feeling. As in every job, some days are more trying than others.

But the waits are the hardest part. While the crew, presumably, are making progress with the new flight plan at base operations and are satisfactorily filling their stomachs, the time for the new takeoff approaches—minute by minute. If the fuel truck is delayed, the pressure builds, for the bird has got to be ready to meet its estimated time of departure. Whether or not the flight engineer will get his share of chow remains a question, sometimes until the very last minute. And sometimes at that very last minute he realizes that he is not going to get it. Good pilots and crews don't let this happen, but to say it never happens is just not true. Chadwick takes it in his stride. He has been doing this for the past five years now and in that time he has grown somewhat philosophical.

Tomorrow at Dawn

Today he finishes refueling fairly soon. He yells at a passing alert jeep and hitches a ride to operations. The crew is just about ready. Chadwick runs to the snack bar and orders a ham sandwich—faster than a hamburger—gulps a cup of coffee, jumps into the waiting truck and heads back to the aircraft.

The pilots and three new passengers climb aboard while Chadwick remains outside and takes his place as fire guard at the number two engine. It's still cold and still snowing and it seems to him that the pilots must be writing their memoirs up there—but finally the copilot twirls his finger. Chadwick indicates all is clear, and the prop lurches around.

Then the plane is alive again. He pulls the extinguisher clear of the aircraft, ducks under the wing, hauls himself through the barn-like door which is taking the blast from the left engine, closes and locks it, hurries up to take his place behind the pilots as the craft begins to move.

From here on it's a repetition of the flight down, although it will be about an hour shorter because of the tail wind on the way back. But it will still be a three-hour haul—and it will be dark when they get there.

The ship flares out as a line of bright red lights pass underneath. Throttles are back, airspeed decreases and then a slight jounce indicates the return to earth while the yellow runway lights flash by at a tremendous rate. The plane slows down. Flaps, boosters, cowls, props, radios, all need some attention. The ship turns off the runway. Chadwick stands behind the pilots and helps them see into the blackness as the plane is taxied back through the maze of taxiways and in between the parked planes. Then finally, the plane is back on its own familiar ramp. The engines are cut off, the passengers grab their bags and leave, the pilots record the amount of time they all have flown—and then they too are gone.

The cold begins to seep in now, as the bird is cleaned up, gassed, and given one final check. The cabin light is turned off, the steps are pulled into the blackness of the bird's interior and Chadwick makes the slightly uncomfortable jump to the ground. The big door is swung shut and the handle is latched. The bird sits there—unconcerned. Chadwick gives her a punch with the heel of his hand and then one last glance as he hurries off. It's eight o'clock now—2000 hours—not late enough for a day off tomorrow, when the *Gooney Bird* and Chadwick are scheduled to fly again—just after dawn.

In the Name of Congress

No. 8 IN A SERIES

BRIG. GEN. KENNETH N. WALKER

By mid-1942, the high-tide of Japanese expansion in the Pacific had been reached. In September, the 5th Air Force was formed, new aircraft began to trickle in, and airmen took the first steps on the . . .

LONG ROAD BACK

by SMSgt. Hal Bamford

At the base of an active 700-foot volcano, which rumbled its earth-shaking warning every few minutes, Japanese fighters snarled to life, straining to get into the air to answer a now almost daily alert. From over the water at 8,500 feet, 12 U. S. heavy bombers, six Convair B-24s and an equal number of Boeing B-17s, headed for the shipping at anchor in Rabaul harbor in a rare daylight strike.

Before the defenders could reach them, the American four-engine giants unloaded their deadly cargoes and began climbing turns to escape the inevitable fury which always accompanied raids on New Britain Island. Below the 500- and 1,000-pounders were taking a vicious toll. No less than nine ships were hit; one was sunk, and six others left burning. An estimated 50,000 tons of shipping was destroyed or crippled.

The day was January 5, 1943. A week later *Time Magazine's* cover story on Lt. Gen. George Kenney began, "Last week was the most successful week of the war in the Southwest Pacific. . . . Last week belonged to the airmen."

What the story didn't tell were the details of that raid. Of the 12 American bombers which took such a stinging toll, two did not return. Included in the airmen aboard the two B-17s which had been lost was Brig. Gen. Kenneth N. Walker, Commander, 5th Bomber Command.

Officially constituted on September 3, 1942, the 5th Air Force was placed under the command of General Kenney with two more-than-able assistants; Brig. Gen. Ennis C. Whitehead, commanding the fighters, and General Walker, the bombers.

Bomber Command headquarters was established at Townsville, Australia, but, from the very start, General Walker was seldom at his desk. The air war was less than a year old and almost every situation called for experimentation. The general would plan, plot, and scheme far into the night, then order some new technique to be tried. Not satisfied to wait for crew reports, he would climb aboard one of the scheduled heavies and accompany its crew to get a first-hand look at the latest development.

In his book, *General Kenney Reports,* the 5th Air Force commander takes note of Walker's continued and unmercifully driving spirit. "Ken was okay. His gang liked him a lot, but his personal problem was tough because he kept himself keyed up all the time and he just couldn't seem to relax a minute."

Inevitably, this desire to see the effects at first-hand led to narrow escapes. In mid-December, General Walker returned from a night mission in a B-17 with three feet gone from its left wingtip—the result of colliding with a tree while flying under low-lying clouds in search of Jap barges. The crew had been fortunate to

nurse its plane home, and General Kenney decided to ground his bomber chief for his own protection.

Shortly after the first of the year, intelligence picked up a tip that the enemy would launch an attempt to reinforce Lae on January 6. Aerial reconnaissance reported an abnormal amount of shipping in Rabaul harbor, and the attack of January 5 was ordered.

Despite his do-not-fly-combat orders of only three weeks earlier, General Walker determined to make the important mission—without his chief's knowledge. The citation which accompanied his Medal of Honor graphically points up his personal sacrifice.

"For conspicuous leadership above and beyond the call of duty involving personal valor and intrepidity at the extreme hazard to life. As commander of the 5th Bomber Command during the period from 5 September 1942, to 5 January 1943, Brig. Gen. Walker repeatedly accompanied his units on bombing missions into enemy-held territory. From the lessons personally gained under combat conditions, he developed a highly efficient technique for bombing when opposed by enemy fighter airplanes and by antiaircraft fire. On 5 January 1943, in the face of extremely heavy antiaircraft fire and determined opposition by enemy fighters, he led an effective daylight bombing attack against shipping in the harbor at Rabaul, New Britain, which resulted in direct hits on nine enemy vessels. During this action his airplane was disabled and forced down by the attack of an overwhelming number of enemy fighters."

On March 25, 1943, in simple White House ceremonies, President Franklin Roosevelt posthumously awarded the Medal of Honor to Kenneth Walker, Jr., 17-year-old son of the fallen hero. General Kenney, in Washington to report on the war's progress in his area, was among the small group gathered to honor his former lieutenant.

BLECKLEY WAS AIR FORCE

LT. ERWIN R. BLECKLEY

LT. HAROLD E. GOETTLER

In the December installment of the *In the Name of Congress* series, the editors noted that only one of the two men participating in the *Airdrop to Immortality* was a member of the Air Force.

Further research, prompted by reader queries was done at the Air Force Museum, Wright-Patterson AFB, Ohio. Facts uncovered there provide incontrovertable evidence that THE AIRMAN was in error. Lt. Erwin R. Bleckley *was* an assigned member of America's World War I air arm.

In quick review, the mission entailed the first recorded instance of an aerial resupply drop in combat history. The unit being supplied during the famed Meuse-Argonne offensive in September, 1918, was the Lost Battalion of the 77th Statue of Liberty Division.

Lt. Harold Goettler was the pilot and Lieutenant Bleckley accompanied him. An initial low-level pass was successful. The two men returned to their home station and again filled the aircraft with bundles. A second pass was attempted, but alerted enemy troops were waiting, the aircraft was shot down by ground fire, and both men perished.

Initial research confirmed the fact that only Lieutenant Goettler was a member of the 50th Aero Squadron. However extracts from Lieutenant Bleckley's service record have since confirmed the fact that he too was a member of this organization.

A native of Wichita, Kans., he was commissioned in the Kansas National Guard on July 6, 1917, and reported for active duty one month later. Early the following spring, the 130th Field Artillery was ordered to France, arriving there on March 30, 1918. Shortly thereafter, Bleckley applied and was accepted for training at the Aerial Observer's School, Tours, France. He successfully completed the course in midsummer.

On August 5, 1918, he initiated a request for assignment as an aerial gunner, and on August 20, Maj. Gen. Mason M. Patrick, Chief of the Air Service, A.E.F., approved the request. Six days later, Lt. E. R. Bleckley was assigned to the 50th Aero Squadron as an aerial observer.

The controversy arose over the fact that the lieutenant is listed in Medal of Honor publications as a member of the field artillery. In a letter to officials at the museum, Lt. Gen. Ira Eaker (USAF, Ret.) helped to clarify this misunderstanding.

". . . Regarding the aerial observers of World War I, I think we all felt they were air people. Most of the observers in the first World War were detailed from other branches. Also, a considerable number of pilots were detailed from other branches, and retained their serial number, rank, and designation in other branches of the Army. In my own case, for example, I was an infantry officer until July 1, 1920, despite the fact that I had been detailed to the Aviation Section of the Signal Corps and on continuous flying duty since early 1918."

Henceforth our roll of Air Force Medal of Honor recipients shall read 47, rather than the 46 we have championed from the first.

There's hardly anything or anybody a tough sentry won't tackle, but Major chewed off . . .

MORE THAN HE COULD BITE

by A/1C Morton L. Levy, *7560th Air Base Group*

MAJOR, like most other APs of the 7560th Air Police Squadron, Alconbury, England, is a very tough fellow. It was this fact that led to his downfall, and a trip to the dentist, for in addition to a diet of raw beefsteak and an occasional prowler, he also chews on rocks, stones, and boulders.

Because Major is an 89-pound five-year-eight-month-old Alsatian sentry dog, he couldn't complain about the pain when one of the rocks broke off his upper right eye tooth, flush with the gum. And it must have really hurt, because the nerve was exposed after the fang broke. Major showed in his daily behavior that all was not well. Besides being restless, he stopped eating steak, prowlers, and even rocks.

And so the base veterinarian, 1st Lt. Charles G. Anderson, was asked about a possible cure for the indiscriminate epicure. Shortly thereafter, Anderson mentioned to Capt. Donald L. Curtis, one of the hospital dentists, that he knew of a dog with a toothache. Curtis who has become a BOQ legend by virture of his exploration into the field of the unknown, decided that this was something new to add to his long list of firsts.

As neither he nor the vet had ever come up against a situation like this before, Curtis decided that dental surgery was the obvious answer. He volunteered to do the job *providing* Doc Anderson put the dog to sleep and made sure he stayed that way until the work was completed.

On Sunday afternoon, Lt. Anderson administered the anesthetic to the patient out in the dog area, wrapped Major in his handler's parka, and brought him, unconscious, to the clinic.

Meanwhile, at the clinic, things were being made ready for the operation. A stainless steel desk was covered with a sheet and transformed into a temporary operating table. There was even an audience; a dozen members of the hospital's staff were present (with cameras) for the unusual operation.

Dr. Curtis discovered that the aching tooth was imbedded in some very firm bone. In order to get the root out, some of the bone had to be cut away. Curtis said that he used the same procedure on this job that he uses on any other extraction. He was assisted throughout the operation by Dr. Anderson.

Approximately half way through, Major let out a loud sneeze, and at once, 14 thoughts turned to the door of the clinic. Curtis remarked that he "had visions of the dog chasing me around the chair."

However, Anderson's job of numbing Major proved to be 100 percent successful. He remained asleep for the entire time, and didn't feel a thing during the 45-minute operation.

It was Monday morning before Major finally came around, and almost immediately became his old self again. But he didn't have to report for duty because the vet put him "on quarters" for the day. He felt a bit under the weather Tuesday, but since then he has returned completely to normal, eating his beefsteak, the occasional prowler, and rocks.

Esprit de Corps Pays Off

Scanning the skies over Japan, F-86Ds of the 40th FIS ma formation.

PHOTOS BY TSGT. CHICO GRACIA, Hq. 5th AF

General White congratulates Lt. Col. L. P. Tate, on attaining 25,000 accident-free hours. To the right is Lt. Gen. Robert W. Burns, commander of Fifth Air Force.

Sporting white sidewall tires, (see page 31) gleaming fuselages, and crystal-clear canopies, the pampered F-86 *Sabrejets* of the *Fighting Red Devils* regularly cut impressive swathes through Japanese skies.

At first glance, this proves nothing more than that the men of the 40th Fighter-Interceptor Squadron, Yokota AB, have a fetish for cleanliness. But digging deeper reveals the fetish is the outgrowth of intense organizational pride and exceptional *esprit de corps*.

With almost loving care, the maintenance crews of the organization are perpetually fussing over their charges. When there is little maintenance to be done, there are already brilliant fuselages to be polished, canopies to be rubbed, flecks of dirt to be flicked.

And when one of the *Sabrejets* comes down with an ailment, its crewchief doesn't rest until it's right again. This feeling isn't limited to the maintenance and support people by any means. It's reflected in the precision flying of the pilots.

Such a unit could be expected to do something outstanding—an expectation fulfilled by 25,000 accident-free flying hours over a three-year period. Coincidentally, the mark was made while General Thomas D. White was touring Far East installations. He stopped in and congratulated the *Fighting Red Devil's* commander Lt. Col. Lindell P. Tate.

e 40th FS maintain a close

With dedicated concentration, an airman packs a "drag" chute.

Freshly scrubbed, mechanically sound, and ready for "action."

Engines are barely cooled before the Sabrejets *get a quick bath.*

"It may be safely claimed that the Union Army was saved from destruction at the Battle of Fair Oaks, May 31 and June 1, 1862, by the frequent and accurate reports of Professor Lowe."

Maj. Gen. Adolphus W. Greely
in *Harper's Monthly*, June 1900

AIRMAN IN A TALL SILK HAT

by TSgt. Harold L. Craven
Airman Staff

At 3:30 a.m. on April 20, 1861, Professor Thaddeus Sobieski Constantine Lowe, wearing a tall silk hat and a Prince Albert coat, boarded a small balloon at Cincinnati to demonstrate that easterly flight was possible despite strong opposing surface winds. His purpose in proving this point was to gain financial support for a proposed transatlantic flight in a larger balloon.

According to Lowe, who had studied cloud movements since childhood, a constant river of swift-moving air existed high above the earth and always moved toward the east. A balloon capable of retaining its buoyancy for a sufficient length of time, he believed, could sail this river to Europe or beyond. He had built such a balloon.

Unidentified Flying Objects

The professor was familiar with wind patterns close to the earth as well as at high altitudes, for he had studied surface winds with the aid of box kites. Many of the unidentified flying objects reported over New Hampshire in the mid-1840s had been whale oil lanterns carried aloft on Thad's box kites.

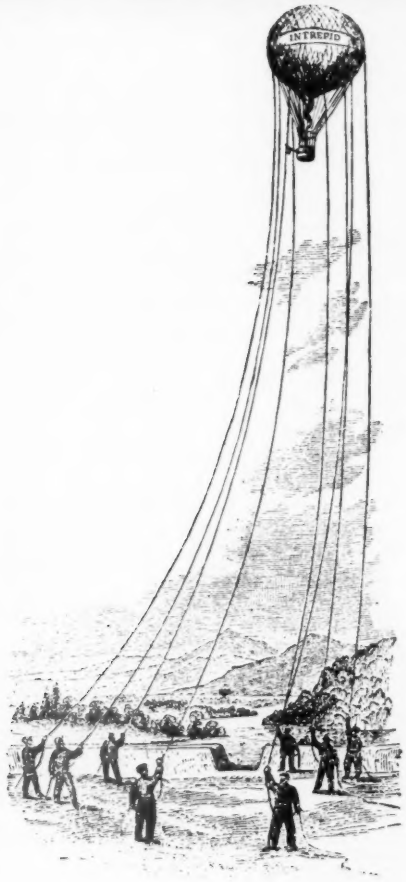
Now he was 29, a veteran of four years experience as a balloonist and the best-known aeronaut in the United States. He was confident that his Cincinnati-East Coast flight would result in greater acclaim and financial support for his forthcoming flight to Europe.

After nine hours flying, during which he had flown at various altitudes up to 18,000 feet, Thaddeus landed at Pea Ridge, S. C., with the assistance of a sturdy mountain woman. Minutes later a group of men arrived with shotguns. The men thought he was a messenger of Satan, or perhaps Satan himself, because of his unusual method of arrival and the fact that his receding hairline suggested a pair of horns. They wanted to shoot him on the spot, but the woman saved him by calling the men cowards and giving them a severe tongue-lashing. Their attention thus diverted, Lowe was able to produce a Colt revolver from inside his coat. He threatened to shoot the first man who made a wrong move. It was a stand-off, and the mountaineers agreed to accompany the professor to Unionville. There they sold him to an innkeeper for coins and corn liquor and departed.

"I can read some," the innkeeper told Lowe, "and I know about your balloon. You're not a prisoner, but I'd be mighty proud if you'd be my guest."

On the following morning the sheriff had to rescue the aeronaut from an angry crowd intent on tarring and feathering him as a Yankee spy. Leading citizens decided he was innocent of any malicious actions and he was allowed to travel to Columbia where he planned to board a northbound train.

He was captured again in Columbia. There faculty members from South Carolina College saved him from hanging by attesting to his status as a scientist, and



Mayor W. H. Boatwright gave him a safe-conduct pass and escorted him to his train.

Because of his silk hat and Prince Albert coat, Lowe was able to infiltrate the ranks of Southern gentlemen on the train. At Nashville he got off the train and followed several members of the Tennessee legislature to their hotel. There he was accorded the same respect as the lawmakers and accepted as one of them. When the legislature voted to withdraw Tennessee from the Union, Professor Lowe was present. He caught the next northbound train, and minutes after his arrival in Cincinnati telegraphed the first news of Tennessee's secession to President Lincoln.

For some time Lowe had been trying to convince the Government of the military value of aeronautics. It is probable that his service as a volunteer spy helped his cause, for although several balloonists had offered their services to the Union, only Lowe received Presidential attention.

Air-to-Ground Communications

Lowe set up operations near the Smithsonian Institution in Washington on June 5, 1861, and began making daily ascensions. On June 18 he demonstrated air-to-ground telegraphy by sending the first aerial telegraph message in history. The message, addressed to President Lincoln and tapped out by Herbert Robinson of the American Telegraph Company was:

"FROM THIS POINT OF OBSERVATION WE COMMAND AN EXTENT OF COUNTRY NEARLY FIFTY MILES IN DIAMETER. I HAVE THE PLEASURE OF SENDING YOU THE FIRST TELEGRAM EVER DISPATCHED FROM AN AERIAL STATION, AND ACKNOWLEDGE INDEBTEDNESS TO YOUR ENCOURAGEMENT FOR THE OPPORTUNITY OF DEMONSTRATING THE AVAILABILITY OF THE SCIENCE OF AERONAUTICS IN THE SERVICE OF THE COUNTRY. I AM YOUR EXCELLENCY'S OBEDIENT SERVANT, T.S.C. LOWE."

Lincoln called Lowe into consultation, then prepared a letter of introduction to Gen. Winfield Scott, requesting that he listen to Lowe's ideas on military balloons.

General Scott gave Lowe an audience but made it plain that he was only listening because he had been ordered to do so by the President and that he had more important things to think about than gas bags.

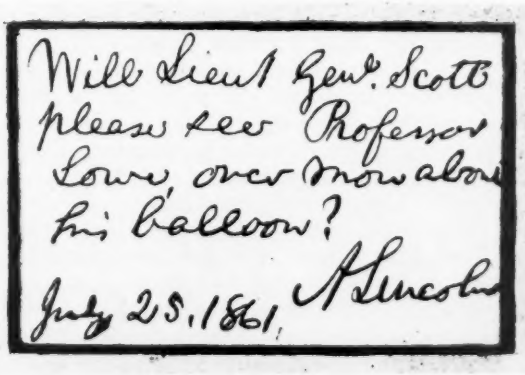
A month later Lincoln called the professor back to the White House to report on the progress of his aeronautical unit. When told of General Scott's attitude he scrawled another note to the 82-year-old officer:

"Will Lieut. Gen. Scott please see Professor Lowe once more about his balloon? A. Lincoln."

Lowe was unable to get past the sentries at Scott's quarters even with the Presidential note. After four attempts he returned to the White House and told the President of his rebuff. Lincoln frowned, picked up his tall felt hat, and said "Follow me, Thad!" Ten minutes later, in the presence of the President of the United States, an unhappy general ordered a Navy captain to give Lowe "everything he needs to set up an aeronautical service on land and sea."

Within 24 hours the aeronautical service was in action, and Lowe eventually built his force to a strength of more than 200 men and seven balloons. He introduced the first aircraft carrier operation in history by operating one of his balloons from the deck of the *George Washington Park Curtis* which was anchored at various times in the Potomac, York, and James Rivers and in the Chesapeake Bay. This balloon, aided by a land-based balloon, helped break the Potomac blockade.

As Chief of Aeronautics, Army of the Potomac, Lowe received ten dollars a day, the maximum amount he would accept for his services. He had been offered three times that amount, but suggested that the lower


Will Lieut Genl. Scott please see Professor Lowe, over now about his balloon?
July 25, 1861. A Lincoln

pay scale would permit the Government to spend the difference for other war necessities. The smaller pay scale would be acceptable, Lowe said, until his commission was approved, at which time he would be satisfied with military pay commensurate with his rank. He fully expected to be given colonel's rank, but this was not to be.

Lack of military rank often put Lowe's operations at the mercy of officers who had little knowledge of the value of aerial observations. Many senior officers, however, were quick to recognize the value of this new dimension in warfare.

Lowe and his top civilian assistants chose a novel way to remind senior officers that they were still awaiting commissions. They flew their missions clad in top hats and frock coats. This inspired laughter from the military ranks, but the "dudes" earned plenty of respect when they went into action. They were top priority targets, and whenever a balloon ascended it was saluted with an iron hail.

Battle of Fair Oaks

The professor nearly lost two of his balloons on the ground during the Battle of Fair Oaks, but his ingenuity in the face of danger saved the balloons and probably the Union. According to Maj. Gen. Adolphus W. Greely, in a story written some years later for *Harper's Monthly*, aerial reconnaissance in that battle saved the Union Army from destruction.

On May 31, 1862, first day of the Battle of Fair Oaks, the lifting force of the balloon *Constitution* proved too weak to carry the telegraph apparatus and associated wires and cables to a height sufficient to overlook the forests and hills.

"I was at my wits end," Lowe wrote later, "as to how I could best save an hour's time—the most precious and important hour of all my experience in the Army.

"As I saw the two armies coming nearer together there was no time to be lost. It flashed through my mind that if I could get the gas in the smaller balloon *Constitution* into the balloon *Intrepid,* which was then half filled, I would save an hour's time, and to us that hour would be worth a million dollars a minute. By use of a 10-inch camp kettle with the bottom cut out, a connection was made and the gas in the *Constitution* transferred to the *Intrepid*."

During the two-day battle he made numerous ascents in the *Intrepid* and telegraphed vital reconnaissance information back to Union commanders.

The aeronauts were accustomed to danger, as were numerous Union officers who flew with them as observers. A British observer attached to Union forces described one dangerous ascension in these words:

"In May 1862 Professor Lowe ascended with Gen. Fitz John Porter whose interest and belief in war balloons contributed to Professor Lowe's success. Gen. McClellan and staff were standing under the balloon, anxious to learn the latest news about the evacuation of Yorktown. Scarcely did the balloon show itself against the sky, above the green forest line, before a terrific fire of siege guns began. The whole atmosphere was filled with bursting shells. One shot passed through the cordage that connected the car with the balloon and struck near where Gen. McClellan stood."

Fitz John Porter was probably the Civil War's greatest military proponent of airpower. The general flew more than 100 missions as an observer, and probably had more bullets fired at him than any other officer in the war. On one of his flights he barely escaped being shot down by enemy rifle fire.

Lowe had assigned his top assistant, Professor Allen, to take Porter on a reconnaissance flight. The general was late, so Allen cast off all the lines except one to avoid delay in ascending when Porter arrived. After awhile Allen became concerned about the general's absence and went to find him. In the meantime Porter appeared and got into the balloon's basket. Unfortunately, a saboteur had poured acid on the mooring lines. The single rope holding the balloon snapped and Porter found himself in free solo flight, moving rapidly across enemy lines.

Despite his experience as an aerial observer, Porter hadn't taken the opportunity to learn how to control the craft. When enemy rifle bullets started whistling around him, however, he remembered that altitude could be gained by throwing sandbags overboard. He got rid of all remaining ballast and the balloon climbed rapidly, and finally reached air currents that carried him back toward the launching area.

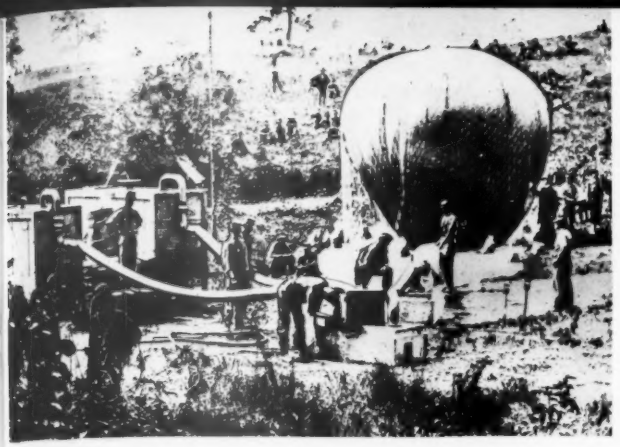
Professor Lowe, learning of Porter's plight, grabbed a megaphone and started shouting instructions.

"Pull the red cord and release some of the gas!"

The general pulled the red cord and released nearly all of it and the balloon became an inefficient parachute which dumped him roughly to the ground near General McClellan's tent. Nothing was hurt but his pride, and McClellan's laughter didn't ease the hurt.

From that day on Allen stayed out of Porter's sight—at Porter's request.

Shortly after this incident a Union soldier captured two Confederate saboteurs who had entered the launch area disguised as escaped slaves working for the Union cause. The men admitted that they were privates who had been offered commissions and $10,000 in gold for destroying one Yankee balloon, and $10,000 more for each additional balloon they could knock out. They also stated that in some cases the best Confederate artillerymen had been told to confine their fire exclusively to balloon targets whenever they were within range.



Union soldiers assigned to Lowe's aeronautical service use portable gas generators to inflate the balloon Intrepid *during the Battle of Fair Oaks.*

Confederate Air Force

The South had its own one-balloon aeronautical service for awhile and it was a many-splendored thing. Gen. James Longstreet told of it in a letter written to *Century Magazine:*

"The Federals had been using balloons in examining our positions, and we watched with envious eyes their beautiful observations. While we were longing for the balloons that poverty denied us, a genius arose for the occasion and suggested that we send out and gather silk dresses in the Confederacy and make a balloon . . . soon we had a great patchwork ship of many hues.

"We had no gas except at Richmond, and it was the custom to inflate the balloon there, tie it securely to an engine, and run it down the York River Railroad to any point at which we desired to send it up. One day it was on a steamer down the James River when the tide went out and left the vessel and balloon high and dry. The Federals gathered it in, and with it the last silk dress in the Confederacy."

While the South recognized the value of the balloons, many highly-placed Northern officials underrated them, and in March 1863 the Aeronautic Department became a separate and distinct unit of the Army, under command of a captain who lacked aeronautical experience, and was given little further support. Lowe, who had personally chalked up the astounding total of 3,000 operational missions in less than two years was tired and ill of a fever, and unable to continue in command. When he learned that his top assistants were to be given pay reductions instead of commissions under the new organization, Lowe submitted his own resignation, but volunteered to participate in one more battle on a nonpay status. He got out of his sick bed and went into action in the Battle of Chancellorsville with Maj. Gen. John Sedgwick. His services must have been worthwhile, for Sedgwick was the only Union general to win a victory in that battle.

Lowe left with the Army a number of ideas and inventions which he believed would shorten the war, but they were not put into use. He had perfected an improved calcium light by which night operations could be carried out without the rays being visible to the enemy; a new signal system that used varicolored phosphorescent balloons; and an enlarging device which he believed would permit photographer Matthew Brady to enlarge aerial reconnaissance photos from three inches in diameter to as much as 20 feet.

Lowe abandoned his pre-war transatlantic flight plans temporarily following his war service, but kept his active mind busy in other fields of endeavor. He invented a refrigeration system and an ice-making machine and earned enough money carrying passengers in a balloon to make the down payment on a steamship which he used to travel from port to port demonstrating the value of his new inventions. He constructed the Mount Lowe Railway in the Sierra Madre Range in Southern California and established the Lowe Astronomical Observatory. Eventually he returned to his airship program.

On February 13, 1909, Professor Lowe told members of the Loyal Legion of the United States in Los Angeles:

"With my knowledge of construction and operation of the largest globular balloon ever constructed, together with the present light and powerful engine construction, I should never again think of directing artillery fire other than that which the airship itself could accomplish. With its tons of powerful explosives and surer aim, under a system I have perfected, it could destroy a fortification, a fleet of ships, or a navy yard.

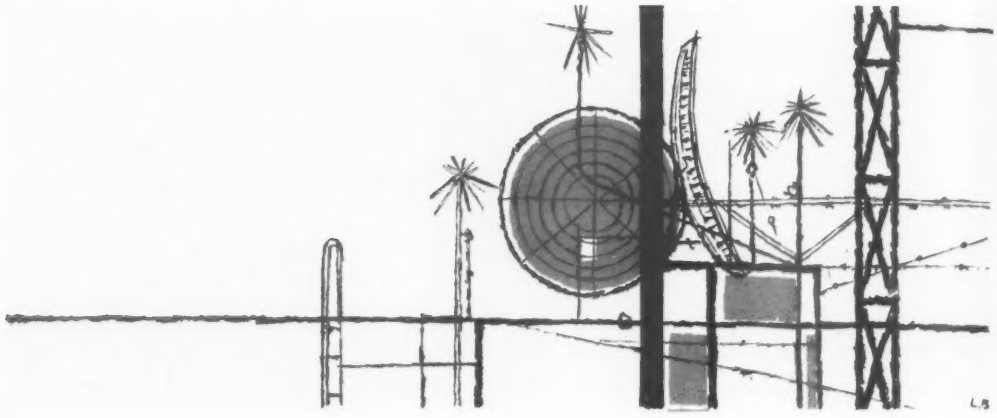
"A fleet of 50 of these machines can be built at the cost of one battleship, and each one would be worth for war purposes more than a dozen of the largest war ships ever built. I could, should occasion require it, build a warship of the air in six months that could be operated with such terrible effect that it would fully demonstrate the necessity of a great international congress which could successfully declare against wars of all kinds."

One of Lowe's loyal supporters, William H. Knight, vice president of Southern California Academy of Science, amplified the aeronaut's statements nine months later with these words:

"Powerful planet airships shall be transformed into aerial dreadnaughts panoplied with deadly missiles. They will swiftly dart to the scene of conflict, and armed hosts will be utterly powerless to contend with an enemy so mysterious and invincible. These terrible engines of the skies will force the responsible heads of governments to confer together and arrange terms of international amity."

As he spoke two military balloonists, Lts. Frank Lahm and Frank Humphreys were making practice flights at College Park, Md., in the U. S. Government's first heavier-than-air flying machine. Military aeronautics had entered a new era.

Thirty-five years, eight months, and 23 days later a single B-29 bomber, the *Enola Gay,* flew over the city of Hiroshima, opened its bomb bay doors, and dropped a single explosive missile marking the beginning of the end of the most destructive war in the history of mankind.



ADVANCED ELECTRONICS FOR AIRMEN

by Capt. William R. Watkins

Keesler AFB, Miss.

Last January a new course in ground electronics began at the Keesler Technical Training Center, Keesler AFB, Miss. Its purpose is to broaden the overall knowledge of ground radar technicians in advanced technical principles as applied to ground radar equipment.

The fact that USAF technicians are becoming too specialized, is one of the primary reasons for implementation of the broadened training. Specialization on certain pieces of equipment, for example, creates problems whenever technicians encounter unfamiliar radar sets. With today's rapid advancement in electronics, the highly specialized technician of old is too inflexible.

In the fall of 1956, a World Wide Radio-Radar Systems Training Conference at Scott AFB, Ill., probed the training and utilization problems existing or expected to exist in the electronics career field. Too much emphasis on specialization at the technician level, particularly in Ground Radar where one career ladder may have as many as eight shredouts, pointed up the need for broader, more generalized training. Although specialized individuals function very well, and are very capable as long as they remain with the same piece of equipment, such a narrow band of assignment for long periods is rapidly becoming impractical.

Frequently, when an airman progresses to the noncommissioned officer ranks, then subsequently to the highest skill level, he is often too limited in his knowledge of related or associated pieces of equipment to make logical and sound conclusions. He is therefore greatly hampered at higher echelons.

Air Defense Command stated at the 1956 Conference that there was a need for men capable of performing duties similar to those of a junior engineer. An entirely new, advanced ground radar technician course of such quality and latitude to provide graduates who could function effectively anywhere within their career ladder was the obvious solution.

Detailed planning later established a course to start with a block of instruction common to all specialties in the ground radar area. Upon completion of this block of instruction, the students proceed into subjects peculiar to their individual career ladders.

The course is 34 weeks long. The first 15 weeks include advanced electronic fundamentals, theory and practical use of test equipment, and organization and management. Upon completion of this portion, students branch out to final phases where they study the systems of their particular fields.

Since the course is taught on a level higher than that ever undertaken in airmen's advanced electronics courses the qualifications for entry are high. To qualify, an airman must: (1) be a noncommissioned officer, or airman first class with over four years service; (2) have at least a 5 level AFSC in the 30351, 30352, or 30353 ladders of the Radio Radar Systems Career Fields; (3) have an electronics aptitude percentile cluster of at least 80 or old aptitude index of 8; (4) be a volunteer, and (5) have a certificate signed by his immediate commander to the effect that the applicant meets all of the above qualifications. There will be no exceptions to these qualifications.

When the student completes the 34-week course, he will be capable of assuming a wide variety of assignments. As time progresses, his value to the Air Force will increase rather than decrease and he will be able to cope with and master new equipment within a relatively short time.

AIRMAN'S WORLD

White Sidewall Spirit

Esprit de corps is a many-faceted thing. Webster defines it as "the common spirit pervading the members of a group." The USAF dictionary calls it "a person's feeling of pride, devotion, or enthusiasm for the unit or group to which he belongs." What it boils down to is your knowledge that you belong to the best outfit in the world. Obviously, the men of the 40th Fighter-Interceptor Squadron, Yokota AB, Japan, believe that organization is theirs. For details, see page 24.

Assistant to the Secretary

Lewis S. Thompson has been named Special Assistant to the Secretary of the Air Force for Manpower, Personnel, and Reserve Forces. He thus succeeds to most of the functions, if not the title, vacated by Assistant Secretary David S. Smith when the Air Force abolished the latter's post to conform with instructions contained in the Defense Reorganization.

Actually, Thompson cannot assume statutory responsibility for administering the Air Reserve Forces. Title 10, U. S. Code, states (in Sec. 264B) that "responsibility for supervising the activities of the reserve components" will not be delegated below the level of Assistant Secretary. Consequently, Thompson's work with the reserve forces will be supervised by Under Secretary Malcolm A. MacIntyre.

Ben Fridge, who had been Mr. Smith's Deputy for Reserve and ROTC affairs, now becomes deputy to Thompson.

Project Scout

Combined USAF and National Aeronautics and Space Agency (NASA) cooperative development has produced plans for a low-cost, four-stage solid propellant vehicle, *Scout*, which should be ready for initial tests by mid-1960.

Dubbed the "poor man's rocket," the 35,000-pound, 70-foot vehicle will be produced at a relatively low cost —in the neighborhood of $500,000—and will be capable of sending a 100-pound instrument pack some 5,000 miles. Designers also believe it will have the capability of putting a 150-pound payload into a nominal 300-mile orbit.

Under terms of the joint agreement, NASA is doing the basic development and will provide USAF with copies of its specifications. An Air Force contractor will then design the necessary modifications required for USAF experimentation. A joint team is presently operating to coordinate the project.

Among the planned USAF modifications are the testing of inertial guidance components and advanced aerodynamic configurations. In order to be successful, it will be necessary that the payload package be stable about all three axies and controllable in response to guidance signals. USAF management for its part in the project has been assigned to the Air Force Ballistic Missile Division at Inglewood, Calif. A prime contractor will be responsible for supplying equipment and providing support during test firings.

Initial test firings will be conducted at NASA's Wallops Island Test Station off the Virginia coast. Solid propellants will simplify the launching procedure and eliminate much of the countdown and launch facilities needed to shoot liquid-fueled vehicles.

Illegal Miniatures

USAF officials have announced that certain unidentified commercial concerns have placed an unauthorized miniature version of the Air Force Commendation Medal on sale for lapel wear.

Manufacturers of the medal are utilizing the proper ribbon, but are relying on a miniature version of the pendant which is part of the old award formerly authorized for Air Force wear.

Ribbon bars for the new USAF medal, which are predominantly yellow with blue edges and three bands of blue spaced in the center, are presently available through commercial sources and may be purchased and worn by personnel entitled to wear the award. However, the pendant for the new medal, originally scheduled to be ready by March 1, has been temporarily delayed. When ready, it will be readily recognizable by the USAF Coat of Arms embossed on the front. (See cut.)

When specifications for the new pendant become available, authority for its manufacture and sale in miniature size will be provided certified manufacturers through Department of Defense channels. Until then, USAF members are cautioned not to purchase the medal presently being offered for sale.

Insurance Information

Veterans Administration officials have identified the groups of GI insurance policyholders who will or will not share in the current round of regular annual dividends.

More than five million policyholders will cut up a dividend pie topping $256 million. Nearly a million additional holders will not share in the annual dividends.

Participating policyholders include approximately 300,000 owners of USGLI policies, originated in World War I and bearing the letter K before the policy number. Nearly five million NSLI policies with the letter V preceding the policy number are also eligible for the 1959 cut.

Four categories are not eligible. These include about 700,000 holders of Korean and post-Korean policies which are non-participating and may be identified by the letters RS, W, or RH before the policy number. A second group includes about 150,000 servicemen who, prior to January 1, 1957, placed their V or K policies under in-service waiver of premium payments and who have not rescinded such waivers.

About 70,000 additional holders are also ineligible. These include owners of NSLI or USGLI policies in the V and K series which are classified as extended term insurance, and holders who, because of disabilities incurred during World War II, were issued non-participating insurance. The latter are identifiable by the letter H.

For Personal Use Only

Hq USAF has issued a word of caution to all personnel planning private automobile shipments to overseas bases.

Repeated instances of violations of auto shipment regulations have come to light. Basically, some overseas automobile dealers have been approaching military members with offers to "loan" them the down payment on a new car. Once the car has been purchased and shipped overseas, the erring member drives it for the minimum period required and then sells the car to the agent who aided in its purchase.

Restrictions regarding shipment of privately-owned vehicles are fully outlined in paragraph 91112, AFM 75-1. USAF members contemplating such shipments are cautioned to familiarize themselves with these limitations.

Bits of Blue

. . . From among 165 USAF installations, Wright-Patterson AFB, Ohio, has been selected as the 1958 Grand Award Winner in the Air Force's Annual Fire Prevention Contest. Biggs AFB, Tex., and Pepperrell AFB, Newfoundland, finished second and third, respectively. Honorable mention was awarded to 18 other bases.

. . . Success of year-long service tests on the elimination of postal money order sales from APOs has led to permanent discontinuance of this service at 31 addresses where commercial money orders are available from military banking facilities. Full implementation of the program is expected to result in a saving of more than 50 postal clerk slots in overseas post offices.

. . . A series of ten one-week courses in pavement maintenance have recently been completed. Over 400 USAF specialists and technicians received the refresher training from instructors furnished by four civilian organizations at no cost to the service. Courses were conducted at Kelly (Tex.), Orlando (Fla.), Maxwell (Ala.), March (Calif.), Hamilton (Calif.), Randolph (Tex.), Bolling (D. C.), Wright-Patterson (Ohio), Offutt (Nebr.), and Otis (Mass.), AFBs.

. . . New restrictions on household goods weight allowances have gone into effect on orders issued after the first of this month. USAF military members traveling to and from Hawaii, Japan, and the Philippine Islands are now limited to 2,000 pounds net. This restriction does not include the weight of hold baggage, professional books, papers, and equipment, and hand baggage. Members returning from these areas, who were assigned there on orders issued prior to the May 1 cut-off date, will be authorized the weight allowance prescribed in paragraph 8001, Joint Travel Regulations. Priority of household goods within these limitations should follow this general pattern:

Essential Items: Dishes, silverware, pots and pans, kitchen utensils, iron, ironing board, household linens (including blankets, sheets, and pillows), and all equipment for infants and small children.

Optional Items: Television, radio, phonograph, deep freeze, clothes dryer, air conditioner, electrical appliances, and small decorator items.

Items Not Required: Living room, dining room, bedroom, or kitchen furniture, stove, refrigerator, and washing machine.

Probably USAF's toughest 90-day TDY stint is that spent by fighter pilots and crews on tension-packed Taiwan. Although the Lockheed F-104 *Starfighters* remain in place, every three months, new crews are flown in to replace those scheduled to return stateside. The gradual changeover normally takes about 10 days, but assures a continuing alert of the island's defenses. Most recent organization to leave this Chinese Nationalist stronghold was the 337th Squadron, commanded by Lt. Col. James Jabara, the Nation's top living jet ace, who scored 15 victories in Korea. The unit has returned to its home station at Hamilton AFB, Calif.

. . . *The Air Force Blue Book,* which began publication last month, is available at base exchanges or directly from the publishers, Military Publishing Institute, Inc., P. O. Box 2688, Grand Central Station, New York, N. Y. Topped by a four-color cover, the book contains 400 pages and costs one dollar per copy. The publication was prepared to bring about a greater understanding of Air Force work and contains a section, entitled *Air Force Facts,* which is a compilation of many facts, figures, and other pertinent information highly useful to any USAF member.

. . . The State of Montana has announced an extension until December 31, 1959, of the application period for its WW II bonus. The eligibility period includes all service between December 7, 1941, and September 2, 1945. Payment rates are $15 per month for foreign service or when flying as a crew member, and $10 per month for stateside duty. The $15 "flight pay" does not depend upon geographical location during the period.

You Ask It

Q. If I should add the new total disability income rider to my GI insurance and later become disabled so I could not work, how much money would I receive?

A. You would receive, after six-months' total disability, income amounting to $10 per month for each $1,000 insurance up to a maximum payment of $100 monthly.

Q. Is a "peacetime" veteran with a 50 percent disability entitled to more compensation for dependents?

A. Yes. Peacetime veterans, rated 50 percent or more disabled, may be entitled to additional compensation for a wife, minor children, or dependent parents.

Q. I have a Korean GI term-insurance policy. Is it possible to convert to a permanent plan?

A. Yes. Effective January 1, 1959, if your policy number is preceded by the initials "RS," it is convertible.

Q. After such insurance has been converted, is it possible to borrow against it immediately?

A. No. You must hold your new permanent-plan insurance for at least a full year before you have the right to borrow on it.

Q. Assuming that I do borrow against permanent-plan insurance, is there any special way in which I must repay this loan?

A. Repayment of the principal on GI permanent-plan policy loans may be made at any time the insurance is in force. Amounts of $5 or multiples of this figure are acceptable.

Q. I don't want to take my GI insurance dividends in cash. What kind of arrangements can I make with the Veterans Administration to hold them to my credit?

A. You have a choice of two plans under which your dividends will draw interest. You may tell the VA to hold them for you on deposit, or, under a second choice, the dividend credit plan, VA holds your dividends and will automatically withdraw funds to pay your premiums in the event you should miss payment.

Q. I am a World War II veteran and have never applied for a home loan. How much more time do I have in which to get such a loan?

A. WW II veterans have until July 25, 1960 to apply for a GI loan. The law allows up to a year after that date to complete the deal.

Q. I understand it is possible to make extra payments on a GI home loan without having to pay a penalty charge. Assuming this is done and at a later date I become hard-pressed for money, could I then apply the extra money already paid in against current payments?

A. Yes, if your lender agrees to such an arrangement. Extra principal already paid may be applied to regular payments to prevent the loan from going into default. However, there is something else to keep in mind if you are planning on making extra penalty-free payments on your home. Remember that each extra payment must be at least as large as a regular monthly payment or $100, whichever is less.

Mittens on the keys seems an apt description of a recent goodwill tour of Turkey by the 17th Air Force Dance Band. Bridging the language barrier with music, the band played 22 performances during its 5,000-mile round-robin trip from Libya. Performance settings varied from a plush hotel in Istanbul to unheated schoolrooms which required band members to wear overcoats and gloves. An estimated 50,000 persons witnessed the multiple performances. A high Turkish government official commented, "You have made more friends for the United States in your short visit in my area than any other single group to visit us."

Air evacuation teams at Tachikawa AB, Japan, recently completed a concentrated four-day course in handling of polio cases in the Far East area. Prior to this, it was necessary for iron lung teams to be dispatched from Brooks AFB, Tex., to handle the evacuation of polio victims. With three teams in Japan and one in Hawaii, portable respirator personnel are now available to cover nearly any emergency which may arise. The SAM resporator which is used on such missions is identified as a half-tank model and was invented in 1951 at the School of Aviation Medicine.

Air Age Library

PROFESSIONAL

The Impact of Airpower, Dr. Eugene M. Emme, (D. Van Nostrand, $12.50). A scholarly anthology of professional writings on aerospace power. Hundreds of essays, articles, and book excerpts by distinguished military and civilian authors are included dealing with air doctrine, strategy, techniques, and related topics. The book is the current selection of the Airpower Book Club.

ROCKETS AND MISSILES

Rocketry and Space Exploration, Andrew G. Haley, (D. Van Nostrand, $6.75). A history of rockets and missiles from ancient times to the present. The book's main strength lies in its coverage of early rocketry and development of the science through World War II.

Illustrated Guide to U. S. Missiles and Rockets, Stanley Ulanoff, (Doubleday and Co., Inc., $3.95). A former CIC officer, the author describes more than 65 types of U. S. missiles and rockets. In addition, he defines many technical terms which are common to the jargon of the field. Illustrations include photos of the weapons in flight plus diagrams and silhouettes.

FOR THE TEENS

Moon Trip, True Adventure in Space, William Nephew and Michael Chester, (G. P. Putnam's Sons, $2.50). A fine treatment of the problems and theories of rocket flight and space travel in language uncluttered by technical terms.

Wider Than the Sky: Aviation as a Career, Charles M. Daugherty, (Harcourt Brace, $2.95). The appeal of aviation as a career written against a backdrop of aviation history is the book's subject matter. Emphasis is on the development and future of military airpower.

PAPERBACKS

The Fastest Man Alive, Lt. Col. Frank K. Everest as told to John Guenther, Pyramid.

The Prisoner of Combine D, Len Geovannitti, Bantam.

The Fatal Decision, edited by Seymour Freidin and William Richardson, Berkley.

Nuclear Weapons and Foreign Policy, Henry A. Kissinger, Anchor Books.

70,000 to 1, Quentin Reynolds, Pyramid.

The Death of Hitler's Germany, Georges Blond, Pyramid.

V-2, Walter Dornberger, Ballantine.

Falling Through Space, Richard Hillary, Dell.

A crew and its Douglas C-133 *Cargomaster* recently returned to Travis AFB, Calif., after a month-long, 16,000-mile trip to MATS Pacific bases. Purpose of the flight was to familiarize MATS crews and local citizens with the new aircraft soon to be introduced into regular service. The tour included Hickam AFB, T. H.; Wake Island; Tachikawa AB, Japan; Kadena AFB, Okinawa; Clark AFB, P. I.; Guam; and Midway Island. More than 100,000 persons, including thousands of Japanese school children, inspected the giant transport.

BASELINE USAF

NEW COURSE

Keesler AFB, Miss.--This ATC Technical Training Center recently announced the initiation of a new course, AC&W Operator (SAGE).

Early classes began study under a two-shift system with a student load of 20 per week. The load is being gradually increased and by mid-July is expected to reach its maximum goal of 30 graduates weekly.

Course objective is to train airmen in the basic fundamentals of complex Semiautomatic Ground Environment Equipment prior to assignment to Air Defense Command.

Open to basic training graduates and to retrainees, the course is of 17-weeks duration. Upon graduation, students will get AFSC 27330B and be assigned to one of 29 SAGE Direction Centers located within the United States.

GOODIES FROM HEAVEN

Harmon AFB, Newfoundland--Gifts of food literally rained down on the residents of Upernavik, Greenland, recently as members of the 4087th Air Transport Squadron at this station dropped nearly four tons of foodstuffs to the ice-bound village.

Excessive ice caused two ships to turn back from attempted supply missions. The Greenland Trade Department requested assistance from the 8th Air Force, asking permission to store the food at Sondrestrom AB on the island's southwestern coast. Within days after the foodstuff's arrival, it had been packaged for airdrop and delivered to town residents.

DOUBLE CURRICULUM

McGuire AFB, N. J.--Student nurses in the nearby Trenton area are following a double curriculum these days. In addition to nursing training, they are also learning the rudiments of judo from experts at this station.

After 17 freshman nurses recently completed a 10-week course, William McKinley Memorial Hospital's administrator termed the course "extremely useful in our program of health and protection for the nurses." He concluded his letter to the base commander, Col. Rufus K. Ward, by saying, "I am certain your cooperation has done a great deal for our community-armed services relationship."

UNIVERSITY EXPANSION

Clark AFB, P. I.--Vincente G. Sinco, President of the University of the Philippines, recently assured students at this base that they would continue to be academically served by the U. P. extension.

Said to have a faculty above the average, President Sinco assured students that U. P. credits are recognized in nearly every school of higher learning in the United States.

The Clark AFB branch was founded in 1953 and since that time has graduated nearly 400 servicemen and dependents. An additional 1,500 have received credits which they have transferred elsewhere.

Col. James K. Dowling, base commander, also spoke at the convocation ceremonies.

SLANTS ON SPACE

/// Will the asteroids prove a troublesome traffic hazard in space?

The question is prompted by a report to Congress that probing the atmosphere of Jupiter with a half-ton of instruments will be a definite capability in a few years, utilizing adaptations of ICBM hardware already under development.

What is known about asteroids to date is something to be reckoned with in the advance planning for such a probe. What isn't known means that science has a big order of work cut out for it—and beginning right away, for a few years is a neglible time interval by astronomy's standards.

To begin with, there was long considered to be a gap in the otherwise orderly progressive spacing of the solar system's planetary orbits. Theoretically, the pattern called for a planet between Mars and Jupiter. Not until the last century did discoveries begin to establish that coursing through the general orbit of the supposedly "missing" planet were a number of celestial small fry, now variously called asteroids, planetoids, and minor planets. Speculation since has centered mainly on whether they are fragments of a true planet which failed to "firm up" during its formative period or else the debris of a planet which disintegrated for some reason after taking form.

This orbital belt in which the planetoids course around the sun is broad—one estimate places the width in excess of 300 million miles—and it would have to be traversed by any probe successful in reaching Jupiter's environment. The total planetoid population is unknown. Some 1,600 of these objects are listed as well known scientifically, with another 5,000 grouped in the category of "observed at one time or other." Against this total are ranged astronomical opinions that, at the very minimum, a complete census of the baby planets would be 50,000.

The rate of identifying new members of the family to date has been less than moderate, even in this age of powerful telescopes. About 100-a-year would seem to be the average. Many of the identifications are by-products of major stellar studies, a short bright streak on a photographic plate indicating the movement of an atseroid in the original study area.

For the future uses of astronautic ventures, unfortunately, mere identification or limited observation is not enough. The most important data would be complete information about an asteroid's orbit. Which adds another rub or two. Compared with the regular planets, the baby editions have far less uniform and more diverse orbital paths. Nor are all asteroids to be located within the main belt. Some are to be found beyond the inner and outer boundaries. Then there are occasional mavericks which have strayed off toward Mars and the Sun. Back in the 30s one of these, Hermes by name, passed within 485,000 miles of the Earth, or only about twice the average distance of the Moon.

Little is known thus far about the physical characteristics of asteroids. Those subject to observation have varied in shape and size. The largest has a diameter of about 480 miles and at the other end of the scale are pygmies less than a mile across. One sampling survey of catalogued minor planets came up with the finding that 150 had diameters in excess of 50 miles, while the majority ranged from 20 to 50 miles.

Since all these celestial bodies move with velocities conforming with their various orbits, the asteroid belt scarcely suggests a deserted freeway that a probe might cross any time with certain immunity.

A concerted study program has now been inaugurated under sponsorship of the National Science Foundation to expand existing knowledge about the planetoid zone. Particular emphasis is attached to determining orbit locations and related data with the accuracy desirable for navigation purposes.

/ / /

/// For reference during future lunar probe attempts: Best estimates are the gravitational pull of the Earth and that of the Moon become equal about 30,000 miles from the Moon. The mean distance between the two bodies is roughly 240,000 miles.

/ / /

/// Strictly speaking the word "infinity" cannot be properly applied to anything in the physical world because it means unlimited in quantity, or boundless. The term is used in mathematics to describe something greater than an assignable quantity that may assume a succession of values, which need not be distinct. Thus the number of ellipses an orbit may take is said mathematically to be infinite. Since the term figures mathematically often with space problems, some old-time airmen whose memory goes way-back-when claim to see a happy omen in the fact that the mathematical symbol for infinity is suggestive of a crude representation of the old-fashioned wooden prop. The symbol: ∞.

/ / /

/// "Long hair" may be an uncomplimentary epithet in bebop talk but hardly that if applied to a spectacular class of performers in space. The old Greek tag for what we call a comet was "komatas," a word originally meaning "long haired" but poetically descriptive of a comet's luminous tail which sometimes has been 100 million miles long. Passing into Latin, the term was paired with the word for star, "stella comata," or "hairy star." —WILLIAM A. KINNEY

TUNNELS OF TULLAHOMA

by Dave Karten

Editor's note: *What happens when a plane or missile flies at 10,000 miles an hour? How do you check a jet engine's combustion at 15 miles above sea level? How can you test the flight stability of an aerodynamic shape flying at 15 times the speed of sound at temperatures hotter than the surface of the sun?*

Answers to these and other seemingly imponderable questions are being sought and solved daily at USAF's Arnold Engineering Development Center, Tullahoma, Tenn.

To get the AEDC story THE AIRMAN *sent a member of its staff to Tullahoma to spend a week watching the tests. This is his firsthand report.*

THIRTY minutes to zero an insistent siren signals everyone out of the engine test cell bay area. Inside the control room "blockhouse" you can see the rocket motors on closed circuit TV. Bolted motionless in the cell the little monsters are not impressive. Through the television monitor scientists and technicians watch the rockets suspended as if in outer space. Questions course through their minds—"Will they go?" "Can they stand it?" We'll know soon.

The hours of preparation which began this morning are complete. Computers are programmed, mathematical formulae computed, directions given, engineers and technicians are in place. Night gathers over the Tennessee Valley as Air Force personnel, contractor specialists, and scientists gather for the regular ritual.

Before consoles computing temperatures of 2,000 degrees, high-speed movie cameras that record microseconds, and instruments that study stability, people sit . . . waiting for the moment.

In half an hour if all goes well, an *Atlas* intercontinental ballistic missile will be "launched," photographed, and directed, by some of the most modern scientific apparatus known to man. In preparing the *Atlas* model for tonight's test, the air supply and exhaust systems are set up to fire the rockets at various altitudes.

The scene isn't much different from Canaveral or Vandenberg. Smaller maybe, but the same harried young faces, the sports shirts, overalls . . . the tense looks at batteries of gauges and dials . . . the brassy cacophony of intercoms and alarm buzzers.

As the countdown approaches zero, the lights dim and all strain forward. A technician with earphones clamped to his head observes: "I hope it goes. They've been waiting on the pad for this."

The steady hum of giant generators siphoning off the gigantic power of TVA grows louder by the second. It is now one minute to zero.

"All three rockets selected."

"All white lights are on."

"Close your bleed valves."

"Watch the pressure."

"Check that all green permissive lights are lit."

"Sound the three five second blast."

"You with me now?"

"All green lights are on; start your strip charts and CEC."

"We are 15 seconds away."

"5, 4, 3, 2, 1. Zero!"

A technician jabs his finger down on the red button.

Next moment there is a hollow *whoom* and a muted roar of boosters and sustainer rockets. The rocket motors tested tonight are exact scale models of the big ones on the *Atlas*. They boil and smoke with the same frosty shrouds of liquid oxygen and generate thousands of pounds of fiery thrust inside the steel test cells.

Electronic computers and cameras are recording the effects. Eyes are intense, computers are impersonally recording data on impersonal tape—tape with meaning.

An ICBM has just been "launched" to outer space. Can it come back through the earth's atmosphere intact with a nuclear warhead to deter enemies? An *Atlas* with these rocket motors is waiting on the pad. Will it be fired? It will cost $3,000,000 to launch but what will it do?" The tunnels of Tullahoma tell them.

The chief test engineer watches Flexowriters and plotters automatically typing and point-graphing advanced data in semicorrected form as it is fed back into the "electronic brain" Univac ERA 1102 computers. The reduction system returns 250 inputs in 30 seconds.

"The entire missile program," explains the engineer, "is waiting for this information." Tearing the punched tape from the Flexowriter, he rushes it to Arnold's communications center where it is teletyped directly to Convair at San Diego where appropriate design changes are made, if necessary. Also, in a matter of minutes Cape Canaveral receives cold data that reveals the probable success or failure of tomorrow's missile flight, to a great degree.

In the pre-dawn darkness a mighty *Atlas* lifts itself aloft and enters outer space. The tests at Tullahoma were correct. If they had not been the multi-million dollar *Atlas* would not have lifted off the launch pad.

So, night after night, and day after day, in the tunnels and test cells of Tullahoma, such tests determine the strength or weaknesses of the space weapons for all the Armed Forces. By finding out on the ground what the safe operating conditions, performance characteristics, and limitations of our new weapon systems and compo-

Maj. Gen. Troup Miller Jr., commander, AEDC and R. M. Williams of ARO Inc., the center's operating contractor, watch instrument panels and TV monitors.

nents are, not only do we save development time, but also prevent loss of an expensive missile or an aircraft and its priceless human cargo through failure in flight. Also, valuable data can be recorded to solve problems on equipment already in service with operational units.

Every day at AEDC such testing with incredible heat and man-made winds is shaping the future of flight and helping chart the way to outer space. These advances in research are publicized almost daily in newspapers and magazines, but not so well known is the origin and background of ARDC's "test tube for future flight."

Arnold Engineering Development Center is located in the midst of a 40,000-acre reservation in the Tennessee hills about halfway between Nashville and Chattanooga.

This vicinity has been the location of forts and training grounds for a long time. Part of the present reservation was the site of Camp Forrest during World War II and Camp Peary during the interim period between World Wars I and II. Almost a century ago, General Nate Forrest's Confederate troops were encamped nearby.

Some claim that several centuries before, visitors constructed a stone fort at the confluence of the Big and Little Duck Rivers where one of the South's powder mills was located in the early 1860s.

Within a few miles of the present USAF giant of air research and testing can be found evidence of skirmishes of a century ago as well as the early maneuvers of Patton's armored force of World War II.

Named for "Hap" Arnold

The Arnold Engineering Development Center is named for the late Gen. Henry H. (Hap) Arnold because its inception was due in a large measure to his foresight, vision, and positive action.

When General Arnold became increasingly alarmed over advances the Germans were making in research and development, in November 1944, he appointed a scientific advisory group of distinguished civilian scientists under the chairmanship of Dr. Theodore von Karman of Cal Tech for the purpose of assembling "ideas for new weapons, possibly of the 'Buck Rogers' variety, for use during this war or for post-war development."

His memorandum to Dr. von Karman:

"Subject: AAF Long Range Development Program

Is it not now possible to determine if another totally different weapon will replace the airplane? Are manless remote controlled radar or television-assisted precision military rockets or multiple purpose seekers a possibility? Is atomic propulsion a thought for consideration in future warfare?

Except perhaps to review current techniques and research trends, I am asking you and your associates to divorce yourselves from the present war in order to investigate all the possibilities and desirabilities for post war and future war's development as respects the AAF. Upon completion of your studies, please give me a report or guide for recommended future AAF research and development programs.

H. H. Arnold"

The morning the Germans surrendered to General Eisenhower in the big red schoolhouse at Rheims on May 7, 1945, members of Dr. von Karman's group were inspecting the Hermann Goering Aviation Research Institute wind tunnels at Volkenrode, near Brunswick, and the rocket missile research development centers throughout Germany. At Garmisch they found some of the "Peenemunde boys" working on plans for a transoceanic winged version of the V-2 with a range of 3,000 miles. At Munich's BMW aircraft engine factory they discovered a well-equipped plant for testing jet engines under high altitude conditions that appeared superior to any similar facilities then operating in the U. S. This was disassembled, crated and shipped to the states as reparations.

Dr. von Karman's report to General Arnold said, in part, that the Air Force should "create an extremely advanced development center consisting of . . . among other things . . . huge wind tunnels and high altitude engine test laboratories." His recommendations resulted in the Unitary Wind Tunnel Bill, signed in 1949; construction of AEDC beginning in 1950.

The first test laboratory went into operation in 1953. Since then, testing equipment designed to speed development of rocket motors; turbojet, ramjet and turboprop engines; aircraft; missiles and space weapons has been continually phased through shakedown and calibration into operation. Hundreds of changes have since gone into design, construction, and operation of the tunnels and test cells to keep them abreast of current requirements and prepared for future needs.

A "Plumber's Nightmare"

From the air AEDC looks like a "plumber's nightmare." Its maze of pipes, huge circuits of ducting, overhead cranes and heater stacks, high power transmission lines—source of electrical power from the TVA —lend a bizarre look to the functional maze. The center has about 20 various test cells and sections ranging in size from a foot-square to 16-foot monsters which can accommodate full scale models of aircraft, missiles, or engines mounted in flight-type installations.

To cover its wide range of testing, Arnold has three separate laboratories: the Propulsion Wind Tunnel (PWT); Engine Test Facility (ETF), with its Engine Test Facility Addition (ETFA) and the Gas Dynamics Facility (GDF) with its electric arc-driven "Hotshot" tunnels.

Largest of the three facilities is the Propulsion Wind Tunnel with its two circuits, the transonic and supersonic. In the transonic circuit, the tunnel can test full-scale engines or large aircraft and missile models at speeds of from 350 to 1,100 m.p.h. over a wide range of temperatures and pressures, simulating altitudes from sea level to more than 100,000 feet.

It is designed to solve the problems that develop when you "mate" a particular powerplant with the airframe in which it is to be installed. And matching an engine to a specific airplane or missile presents special problems. The efficiency of engine inlets, for example—which must be large enough to provide the engine with sufficient air, yet shaped and sized to reduce drag—must be determined at various altitude, speed, and flight-position conditions.

In addition, it may be found that a shockwave from the nose or some other portion of the aircraft will be deflected into an engine inlet, disturbing its operation under various flight conditions. In the Propulsion Wind Tunnel, the engine being tested may be tilted up and down, or positioned in a yawed attitude to simulate the same conditions it would undergo in actual flight.

The transonic circuit has been operational and actively used for testing our latest weapon systems for the last two years. It is a continuous flow, completely enclosed tunnel capable of operating from a pressure level which approaches a vacuum to two and one-half atmospheres.

In addition to the transonic circuit, the Propulsion Wind Tunnel facility has under construction a supersonic circuit designed for a speed range of 1,000 to 3,300 m.p.h.

The PWT is also provided with an automatic data recording system and a modern computer so that rapid data reduction is possible. Selected reduced data can be displayed on plotting equipment in the tunnel control room within a minute after a signal is given calling for such data. This makes it possible for test engineers to monitor the progress of a test program and direct re-runs of questionable results.

Engine Test Facility

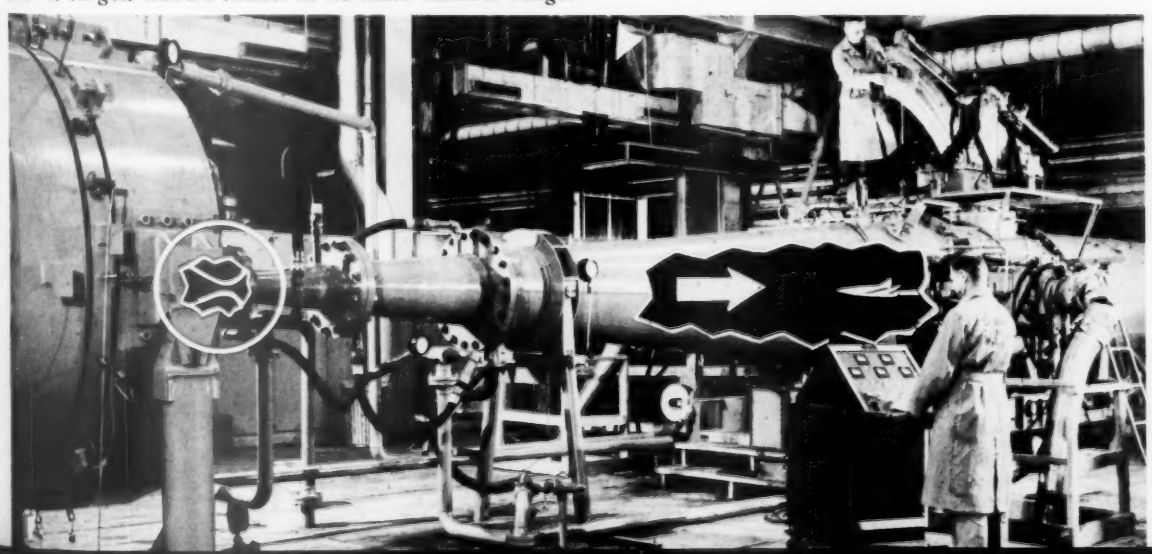
The Engine Test Facility is primarily for testing air-breathing engines like turbojets and ramjets. The engines are placed in test cells and run under conditions simulating operation from sea level to 90,000 feet; and at speeds up to four times the speed of sound—about 2,500 m.p.h.

A complex system of compressors, exhausters, refrigerators, heaters, coolers, driers, control rooms, fuel systems, test cells, and a maze of interconnecting plumbing, electrical controls, and air ducting has been assembled to form ETF. This facility provides ground testing in support of research, development and evaluation of aircraft and missile propulsion systems. These tests simulate practically all conditions encountered during rapid flight maneuvers.

To achieve flight conditions required, the Engine Test Facility is capable of supplying air at temperatures ranging from minus 120 degrees F. to 650 degrees F.; at pressures simulating altitudes up to 90,000 feet and with air speeds to Mach 3.3. It is also possible to vary the angle at which the air enters engine inlets by as much as plus or minus 20 degrees.

Provisions for altitude tests of rocket motors using either liquid or solid propellants can be made in most of the test cells in ETF. One cell, modified for rocket testing, is more suitable for hazardous tests, being outside of the test building and surrounded with high sandbagging. Moderate size rocket motors or models of large motors can be tested in these cells at simulated

Cutaway diagram of "Tunnel B-2" of Gas Dynamic Facility illustrates working of wind tunnels. Conditioned air passes through nozzle (circle) which increases airflow velocity to hypersonic speed before it reaches specially instrumented model mounted in test section. Angle of attack of models can be changed during test runs in some tunnels. Instrumentation measures temperature, pressures, altitude, and provides data to determine stability of aerodynamic shapes under conditions of closely simulated flight at low to extreme altitudes. "Tunnel B-2" is largest known tunnel in its Mach number range.

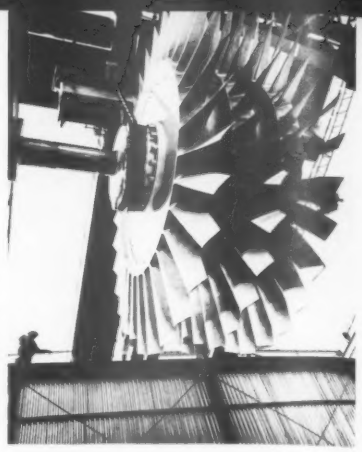


altitudes up to approximately 200,000 feet to determine performance and investigate problems peculiar to high-altitude operation such as poor ignition, changes in heat transfer that cause increased failures, and others.

Engine Test Facility Addition

The Engine Test Facility Addition with air supply and exhaust systems driven by a 149,500 h.p. motor, was designed to test engines larger and more powerful than those now being tested. It can simulate flight conditions up to approximately 3,000 m.p.h. at altitudes up to 90,000 feet and across a temperature range of from minus 120 degrees F. to 800 degrees F.

Arnold's ETF laboratory and Engine Test Facility Addition are the only engine testing labs in the U. S. which have a "variable Mach number nozzle" as part of their test equipment. This permits simulating a complete supersonic flight trajectory, from takeoff to landing, by varying the angle and the speed at which the air is forced into the inlet of an engine fastened inside the test cells.



Giant rotor blades, weighing 1,200 pounds each, "push" the airflow through transonic circuit of AEDC's Propulsion Wind Tunnel.

The "Hotshots"

The Gas Dynamics Facility was designed to test scale models of aircraft, advanced missiles, and space vehicles under altitude conditions from sea level to in excess of 200,000 feet. GDF has a series of various size wind tunnel sections in which scale-model aircraft, missiles, or projectiles may be placed. The aerodynamic soundness of their shapes is determined in both continuous flow tunnels and several intermittent tunnels.

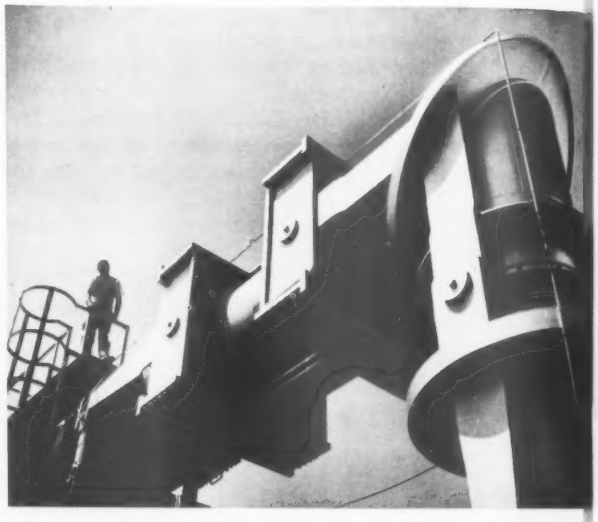
Most dramatic in operation of the intermittent tunnels are tunnels "Hotshot 1 and 2" which, along with the upcoming "F," are the hottest facilities AEDC has to offer in helping explore the so-called "thermal thicket" —the heat problem of atmospheric reentry of missiles when they make their downward plunge toward targets on earth. The problem of devising a nose cone to survive extreme temperatures is a major one for missile manufacturers. Friction of air against a missile's nose at hypersonic speed causes it to heat; threatens to turn it into a flaming meteor.

What materials best survive friction's high temperatures? How should the nose cone be shaped? How can accuracy be preserved during this critical flight condition? A series of tests on almost all of our ICBM and IRBM nose cones, conducted in these Tullahoma tunnels, are helping to answer these important questions.

ARO, Inc., AEDC's operating contractor, pioneered the 'Hotshot" tunnel which uses a huge electrical explosion as its driving force. The explosion is generated in an arc chamber by more than a million amperes. Scale models of the nose cones of the Air Force's *Atlas* and *Titan* ICBMs, the *Thor* IRBM, the *Quail, Minuteman,* and other advanced missile projects have been subjected to severe simulated flight conditions in "Hotshot 1."

Construction on "Hotshot 2" began in the spring of 1956. Its 50-inch diameter test section is more than three times the size of "Hotshot 1" and like "Hotshot 1," it is arc driven.

Early last year escape velocity—the minimum speed needed to propel a vehicle beyond earth's gravity into space—was surpassed in a shakedown test of "Hotshot 2." Already, construction of a larger, faster "Hotshot" tunnel is underway.



Part of ducting in the Gas Dynamics Facility air control system. From above AEDC looks like a "plumber's nightmare."

The escape-velocity-plus test run peak, lasting less than one-tenth of a second, achieved 32,400 m.p.h. It marked the first time the escape velocity figure of seven miles a second had been exceeded in a wind tunnel.

Although the run was over in less than a tenth of a second, special rapid-response instruments recorded the extreme flight conditions. Temperatures higher than 40,000 degrees F. were caused by the friction of the air passing over the model in the tunnel, and pressure resulting from the electrical discharge that heats the air mounted to more than 30,000 pounds per square inch. Such extreme conditions preclude longer runs because of the danger of melting or vaporizing the tunnel components.

"Hotshot Tunnel F," with its larger 100-inch diam-

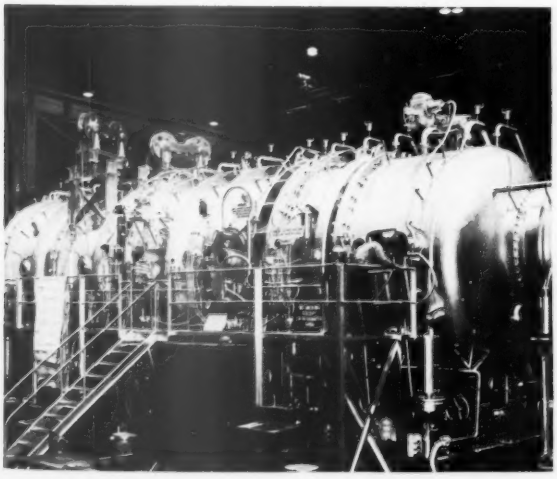
eter test section will make possible testing of large-scale ballistic missile nose cones and aerospace weapon components at speeds ranging from Mach 15 to Mach 25 and above.

"We have demonstrated," says R. M. Williams, managing director of ARO, Inc., "that each of our three facilities has important capabilities to aid in the development of tomorrow's aerospace weapon systems. Work in the Engine Test Facility on the effect of altitude on solid propellant rockets resulted in changes in several missile and space vehicles. Other tests at ETF resulted in designs which would have taken many flight trials to establish.

"In the Gas Dynamics Facility, the "Hotshot" tunnels are so engaged in the DynaSoar boost-glide vehicle program that the experimental work on "Tunnel F" can only be done on a second priority basis. In "Tunnel B-2," we have the only large, continuous-flow tunnel in the Nation with a Mach 8 capacity. It has provided data on a number of high priority aerodynamic and ballistic vehicles. The other GDF tunnels also have done missile work and have important missile tests programmed for them in the future.

"In the big Propulsion Wind Tunnel transonic circuit, significant testing has been going on. A full-scale aerodynamic test on the *Sergeant* missile demonstrated the value of working with the actual production missile when hunting for malfunctions. They were found—and fixed—in a fraction of the time and cost required for missile firings."

Today, Tullahoma's tunnels are far surpassing the job originally envisioned for them. Altitudes, speeds, temperatures, and other rigorous flight environment that are simulated for large model or full-scale space weapons, missiles, aircraft, and engines are far beyond even those prophesied by "Hap" Arnold.



This steel test cell is one of three in the Engine Test Facility. Ramjet or turbojet engines are placed inside. High-speed airflow enters at left, is pumped out through ducting. Periscopes pointed into the 4,000-degree jet permit movies of internal burning during simulated high-speed, high altitude flight.

Perhaps the best indication of AEDC's importance lies in a simple statistic. Today, there are many top priority projects in the Air Force. Only a few are in the fields of science that can't be investigated in the laboratories at Arnold Engineering Development Center.

Already the Arnold Engineering Development Center has contributed major aerodynamic and engine data to some of our country's most important weapon systems. Although many of the test projects, or specific results involved, can't be published, the following weapon systems have undergone test work at Arnold: the F-105 *Thunderchief,* B-58 *Hustler,* IM-99 *Bomarc,* GE J47 turbojet, GE J79 used in both the F-104 and the *Hustler,* the *Falcon, Atlas, Titan,* the Army's *Jupiter, Redstone,* and *Little John,* and the Navy's *Sparrow* and *Polaris.* The X-15 and components for the future manned bomber designed for speeds three to four times the speed of sound and altitudes above 100,000 feet are also undergoing development tests.

Tests are performed for Air Force commands or any other Department of Defense agency, industry, or educational institution whose research and development work requires the use of AEDC's unique testing facilities.

One of AEDC's test cells was recently used to determine effects of supersonic windblast on a life-size dummy strapped into an ejection seat in the cell. High-speed movies showed how the clothing failed and what other safety deficiencies there were as violent windblast struck the dummy. This information is accelerating development of better protective personal equipment for supersonic pilots of tomorrow's aerospace force.

Despite its outward appearance, AEDC is no "ivory tower" for research, but rather an intimate and essential part of the day-to-day operations of the testing of our advanced weapon systems. The combination of theoretical analysis and practical testing provides a practical and efficient approach to the future.

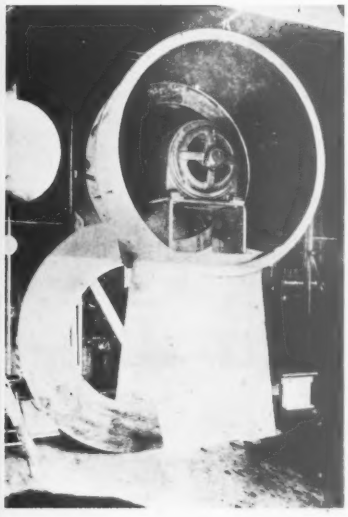
What role will the Arnold Engineering Development Center play in tomorrow's Space Age Air Force?

Maj. Gen. Troup Miller, Jr., USAF commander at AEDC, answers the question this way: "As a part of ARDC, it is our job to help develop qualitatively superior airplanes, missiles, and engines.

"The way we run AEDC—our management, operation, maintenance, and the way in which we advance testing techniques and equipment—is of vital assistance to the engineering staffs of the aviation industry. Our data helps them design, develop, and produce their products quickly and efficiently. It helps insure a higher level of reliability when the time comes for actual first flights.

"The wind tunnel data we produce at AEDC is saving, and will save, hundreds of millions of dollars, as it helps aircraft, engine, and missile contractors to produce the best weapon systems in the world. But above all, it helps 'buy development time.' And today, time is the key factor on which continuation of our way of life depends."

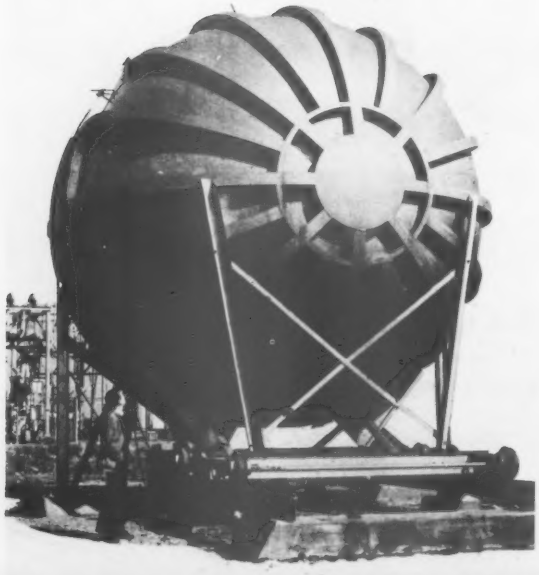
EMBRYO OF AIRPOWER



Above. *This crude looking box is a replica of the wind tunnel used by the Wright Brothers in 1901.*

Left. *This tunnel device was used at Waterbury, Conn., during WW I era to make a study of air speed indicators.*

Below. *NACA used this 16-foot wind tunnel to obtain test data at Moffett Field, Calif., in the Ames Aeronautical Laboratory.*



In 1759 British experimenter John Seaton wrote: "In trying experiments on windmill sails, I found the wind itself is too uncertain to answer the purpose; we must have recourse to an artificial wind. This may be done in two ways, either by causing the air to move against the machine, or the machine to move against the air." Seaton adopted the second alternative and used a whirling device.

A half century elapsed before his idea of "causing the air to move against the machine" was further advanced. Giovanni Batista Venturi, an Italian physicist, was in his shop working on an idea to measure the flow of water through a pipe. He struck the pipe with a hammer and discovered that the water ran faster through a pinched section. The wind tunnel is one of many variations of Venturi's pinched pipe, today's airspeed indicators operate from another since they are tubes with one section smaller than the rest in which the air builds up speed.

F. H. Wenham of Great Britain, applying this principle in 1871, experimented with what is believed to be the world's first wind tunnel.

Man, toying for centuries with the idea of flying, dreamed, flapped his arms, and tried to solve the heavier-than-air mystery on paper.

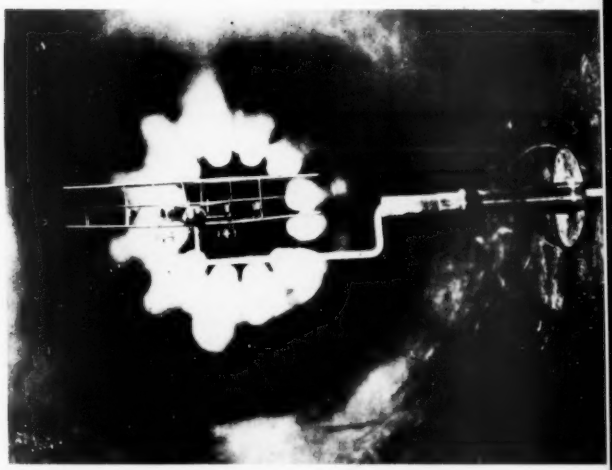
Finally in 1903 the Wright brothers flew. Eighteen years later, at a New York anniversary dinner, Orville Wright made some interesting observations on how he and Wilbur succeeded where thousands of others failed. "We designed new types of measuring instruments and made measurements of hundreds of differing wing surfaces in a wind tunnel. It was due to the accuracy of these (wind tunnel) measurements that we were able, in 1903, to design a new type of biplane, almost entirely from calculation, which was able to lift itself and an operator into the air."

In the year of the Wright's flight, Crocco built a wind tunnel near Rome. Prandtl built a larger one at Gottingen, Germany in 1908. Eiffel constructed one of unique design with an airtight testing chamber at Paris in 1909. And the British Government constructed its first large tunnel at the National Physical Laboratory in 1910.

Today's highspeed wind tunnels (see page 38) are modern refinements of the embryonic tunnels used by the early pioneers.

Airflow from wind tunnel tests traced weird designs on this scale model of the Thomas-Morse fighter of the 1920s.

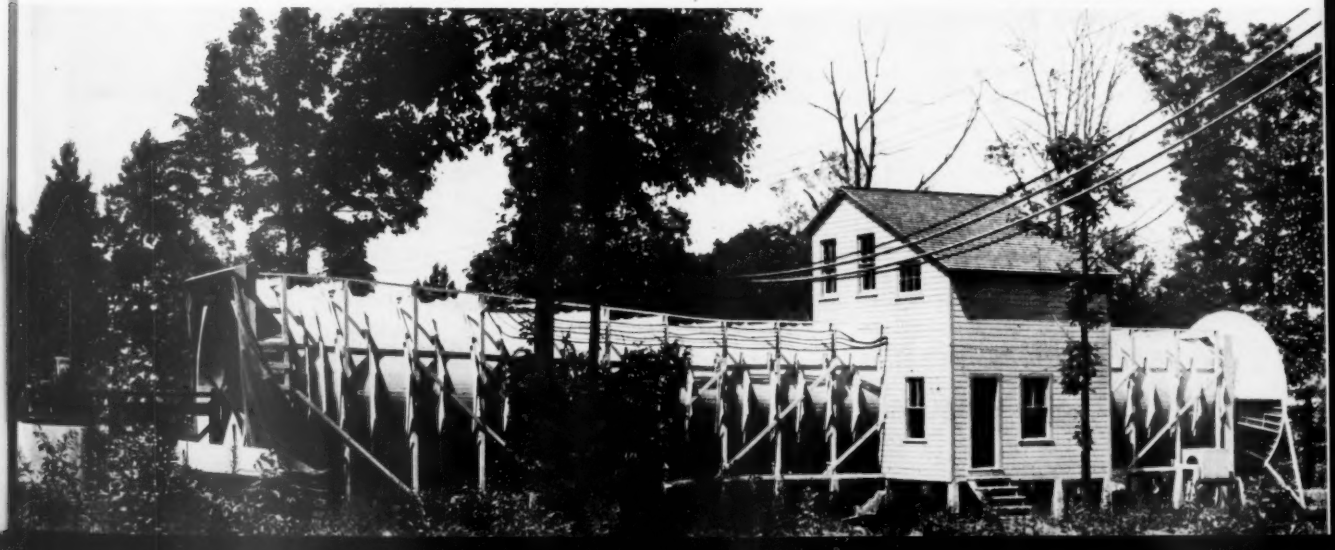
This is what a 14-inch tunnel looked like in the late 20s.



Above. *Performance and stability predictions for the 20-ton Barling bomber were made in 1920 wind tunnel tests. Only one of the six-engined triplanes was constructed and flown in 1923.*

Below. *Bureau of Standards wind tunnel constructed in pre WW I period.*

National Archives Photo



Major Bilotta, right, and an airman skin a recently shot polar bear. Bears, seal, geese, and small birds provided good Arctic hunting and helped replenish food supplies for the scientists and airmen stationed on Drifting Station Alpha.

ODYSSEY OF ALPHA

by C. L. Randall
Charleston AFB, S. C.

(Editor's Note: *Maj. Joseph P. Bilotta, presently commanding the 1608th Supply Squadron at Charleston AFB, S. C., spent seven months in command of IGY station Alpha, a drifting ice island in the Arctic Ocean. This is his story of those eventful months, as he related it to the author.*)

It was a bitter subfreezing April afternoon last year when Maj. Joseph Bilotta landed on a tiny ice island 500 miles north of Point Barrow, Alaska.

He had a tough job ahead of him; to command an ice floe, dubbed Drifting Station Alpha, for seven months in conjunction with the most extensive research project ever undertaken by the world's scientists during the International Geophysical Year.

On his first day at the remote, scientific station the two-by-three-mile island was pushed seven miles north of its original location by howling Arctic wind blasts.

The second day, he noted the island had rotated as much as 50 degrees in 48 hours.

A few days later the USAF-established laboratory split into two separate pieces, ruining a 6,000-foot ice runway designed to land cargo aircraft with food, clothing, and equipment supplies for the 16 civilian scientists and 13 Air Force support personnel stationed on the wandering base.

Just four days later the occupied half of the 10-foot thick island began to shatter again.

Danger was imminent.

"The ice breakup came around 2 a.m.," the island commander said. "It started rumbling way off in the distance and soon it sounded like a bowling ball coming fast down the alley."

Airmen and scientists, working side by side under the impending threat of disaster, moved the 25 buildings and hundreds of tons of supplies to a new ice floe, while construction crews began simultaneously to build a new runway. The immediate danger of complete destruction passed.

After 40 days' work, the new runway cracked before a single aircraft could use it. A road grader, essential to runway construction, was nearly lost to the Arctic Ocean when a small part of the island snapped off with the grader atop it. Luckily, it was retrieved hours later when the ice floe floated back to the main site.

Another runway was soon begun, but also broke up after one aircraft managed to land and take off again. Runway construction ceased until after summer thaws when colder, fall weather would again freeze the

surface. During this interim period, supplies were airdropped by multi-engine aircraft from McChord AFB, Wash., and the Alaskan Air Command.

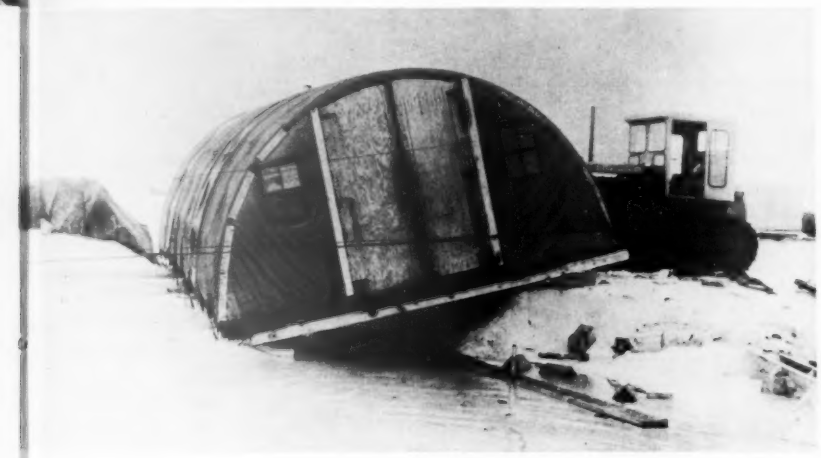
Meanwhile, American scientists continued studies of the aurora, geomagnetism, glaciology, gravity, meteorology, marine biology, and oceanography.

A special task assigned the scientists was taking pictures of the ocean bottom to aid underwater submarine navigation in the Arctic region.

The free drifting laboratory, manned by an all-volunteer force, was just one of many stations where more than 10,000 scientists from 66 different countries studied the earth's phenomena.

Besides the feared breakups, other dangers daily plagued the crew of scientists and airmen. Concealed ice cracks were always a serious threat. A 26,000-pound tractor and a smaller vehicle loaded with supplies were lost when they slipped through a hidden ice crack.

But life on the isolated northern outpost was not always beset by near-disastrous episodes and a short-wave radio provided contact with the outside world. Strangely, clearest reception was received from the South Pole. "We called the South Pole and spoke with them almost daily," Major Bilotta said. Radio contact was also made with nearby Russian installations similar to the American ice island.



A few days after Maj. Joseph Bilotta arrived on the small ice island, it began to split in two. Camp buildings like these were hurriedly moved to a new, safe site. The 26,000-pound tractor shown was later lost when it plunged through a concealed ice crack.

The island contingent had other outside contacts during their stay on Drifting Station Alpha. Every five weeks aircraft brought in much-needed supplies. In August, the nuclear submarine *Skate* visited the floating platform during its record breaking "under the Arctic" expedition. Islanders and crewmen exchanged guided tours and traded items. "We managed to swap some bear meat for ice cream during the submarine's visit," Major Bilotta said.

Other visitors were also seen in the area. Low flying Russian aircraft, similar to WW II B-29s, made infrequent flights over the American island. "One aircraft came down so low the Russian markings could be clearly identified," a young airman said.

Hunting was the most popular off-duty recreation. Polar bear, geese, seal, and small birds helped replenish food storehouses.

When summer temperatures reached 30 degrees, a few island personnel attempted water skiing on a piece of plywood towed by a fiberglas boat which sped up and down an ice crack. The skiers, dressed in heavy parkas and hip boots, bore little resemblance to southern counterparts.

A popular team sport was tug-of-war. Civilian and military workers competed against each other. The two teams lined opposite sides of an ice crack. Losers received a chilling dip in the Arctic waters.

Men selected for duty on Drifting Station Alpha were handpicked and highly skilled. They passed rigorous physical and mental examinations before being assigned to the Arctic camp. The normal tour of duty was six months, and a stateside duty assignment after the island tour was assured.

Major Bilotta left the island in September. His departure was slightly delayed. A new landing strip, completed after summer months, had broken away from the main ice floe. It drifted a mile and a half away, but returned close enough for the major and other outgoing personnel to reach the runway and be taken out by transport aircraft.

Two months later the diminishing island was finally abandoned. Since April it had drifted 500 miles north to within 250 miles of the North Pole; had averaged 5 to 13 miles a day.

The last inhabitants and equipment were air-transported from the island. Increasing ice breakage and oncoming months of total darkness caused the hurried, but orderly departure.

THE THING

by
Lt. Andrew C. Thompson, Jr.
Dover AFB, Del.

It is called a RRHICMD.

Since it is difficult to pronounce RRHICMD clearly enough to be understood, most people at Dover AFB, Del., refer to this odd-ball contraption near the flight line simply as "The Thing."

Although the ball sitting on top of the up-ended drain pipe is colored red, nobody describes the gadget as an attractive addition to the scenery. It doesn't do anything important in everyday life. In the normal course of events it is as useless as pockets in a shroud. But it can, on the other hand, provide certain vital information if ever the need should arise.

The official nomenclature covering "The Thing" is Remote Reading High Intensity Constant Monitoring

Looking down on the unique instrument designed by the base disaster control office, we can see how "The Thing" would serve the community and Dover AFB in case of radiation fallout.

Device, and it is designed to measure the intensity of radioactive fallout. Because of the shielding which surrounds the instrument, impacting radiation is reduced by a predetermined factor, thus permitting accurate measurement of highly concentrated fallout. Most radiation detection instruments have a relatively low range.

The RRHICMD was designed by the disaster control office at Dover, and is unique in that the scale may be read from a remote location, in this case the combat operations command post.

Right now "The Thing" is only several hundred pounds of concrete standing around cluttering up the landscape. But a fire extinguisher is also a pretty useless piece of equipment when nothing is burning. In certain unpleasant circumstances "The Thing" could be a very handy device to have around. In the meantime the disaster control officer is the only one who loves the RRHICMD; he thinks it is beautiful.

pros and cons of a will." Finally, it is not the intent of THE AIRMAN to flatly advise USAF personnel on the best avenue of action with regard to every phase of their lives. Rather, our aim is to make them aware of generalities and to direct them to the proper office for advice on specifics. As noted in the first letter above, we feel that such action is welcomed by the majority of our readers.

★ ★ ★

CLARIFICATION

Sir: *Allow me to congratulate you and the staff on the great job you have done in giving the Air Force such a fine magazine which is a constant source of interesting and valuable information. In* Airman's World *of the February issue, you have an article which may be puzzling to some of your readers. It concerns the christening of an early warning picket aircraft as "The Spirit of Glen City School," and tells of the dedication ceremony involving students from a grammar school in Santa Paula, Calif. Santa Paula is my hometown so I am quite well aware of the fact that it is often called The Glen City. Others may not be aware of this.*

SSgt. Bennie Potts
APO 132, New York, N. Y.

Many thanks. I'm sure not only some of the readers were puzzled—most of the staff members were equally in the dark.

★ ★ ★

WE ERRED

Sir: *In the February issue of* THE AIRMAN, *on page 29, in the article,* Babes and Boxes, *there is an error.*

The Base Claims Officer is not, at any time, authorized to pay claims up to $1,000 as stated. This delegation of authority is vested in the Staff Judge Advocates of the Air Materiel Areas in the United States; AMC; Headquarters Command; Alaskan Air Command; 64th Air Division; USAFE; NAMAP; SAMAP; and PACAF. The Directors of Claims of USAFE and PACAF are also vested with the authority to pay claims up to $1,000. It is believed that your article may cause the Base Claims Officers to be harassed. Therefore, we would appreciate publication of this correction.

Maj. Samuel Birdsong, Jr.
Office of the Judge Advocate General

★ ★ ★

YOU'RE WELCOME

Sir: *Just a word of appreciation and thank you for the simple but most excellent spiritual theme which has become a part of* THE AIRMAN. *You and your staff should be highly commended by all of us.*

Chaplain (Capt.) Dean E. Hofstad
APO 84, New York, N. Y.

more than ever...

THE AIR FORCE NEEDS YOUR IDEAS

AF INCENTIVE AWARDS PROGRAM

AFR 35-12 dated 18 Aug 1958

eternal vigilance
is the price of liberty

JOHN CURRAN, 1808